

To All Interested Parties:

Wolves in Montana are native, iconic carnivores valued by people and cultures across the state and around the world. They also play important roles in Montana ecosystems. Montana Fish, Wildlife & Parks (FWP) has prepared this Draft Environmental Impact Statement (DEIS) to analyze the potential environmental impacts of adopting and implementing a statewide wolf management plan. This DEIS provides alternatives for and the foundation of decisions to be made regarding conservation and management of wolves at the state level under the purview of FWP.

The DEIS describes two alternative approaches for statewide management of wolves in Montana. Alternative 1 is the “no action” alternative or status quo. The no action alternative would keep the 2003 Wolf Plan in place. While the 2003 Wolf Plan was developed to provide flexibility in managing the wolf population, since then, the wolf population has grown substantially. The original population monitoring metrics and techniques, as well as response to livestock depredations are, as described in the 2003 Wolf Plan, outdated and inefficient.

Alternative 2, the proposed alternative, would ensure continued public transparency on how FWP monitors and manages the wolf population to achieve the population management objectives that were initially adopted as part of the Montana Fish and Wildlife Commission’s 2010 season setting process. Updates and improvements on management approaches and tools, strategies on wolf-livestock conflict prevention and response, as well as new science about wolf ecology and monitoring techniques are described in this alternative. The public engagement process as well as existing laws, regulations, and policies, as well as inter-governmental commitments made by FWP and the Montana Fish and Wildlife Commission are reflected in Alternative 2.

Under both alternatives, FWP would continue to manage wolves to sustain a statewide population above the ESA recovery benchmark of 15 breeding pairs. Montana remains committed to maintaining the long-term viability of wolves, consistent with a long history of wildlife conservation. Wolves are now well established in Montana, and the challenge is balancing conflicting values and addressing diverse needs as they pertain to wolves and other wildlife populations within shared communities and landscapes.

FWP is accepting comments on the DEIS for the Statewide Wolf Management Plan through December 19, 2023, 5 p.m. Additional information and the statewide management plan is available on FWP’s website at: <https://fwp.mt.gov/aboutfwp/public-comment-opportunities/draft-wolf-mgmt-plan>

Sincerely,  
Dustin Temple

# **MONTANA GRAY WOLF CONSERVATION AND MANAGEMENT PLAN**

**DRAFT**

**ENVIRONMENTAL IMPACT STATEMENT**

**2023**

# CONTENTS

ABBREVIATIONS, ACRONYMS, AND GLOSSARY OF TERMS.....	6
<b>CHAPTER 1. OVERVIEW.....</b>	<b>13</b>
1.1 INTRODUCTION.....	13
1.2 PROJECT BACKGROUND.....	15
1.2.1 ECOLOGY.....	15
1.2.2 HISTORY.....	22
1.2.3 CURRENT POPULATION STATUS AND DISTRIBUTIONS.....	24
1.3 PURPOSE AND NEED.....	28
1.3.1 BENEFITS.....	28
1.4 AGENCY AUTHORITY AND ACTIONS.....	30
1.4.1 MONTANA STATUTES AND ADMINISTRATIVE RULES.....	31
1.5 PUBLIC OUTREACH.....	34
1.5.1 SCOPING.....	34
1.5.2 SCOPING ISSUE IDENTIFICATION.....	34
1.5.3 KEY ISSUES IDENTIFIED DURING PUBLIC SCOPTING FOR DETAILED ANALYSIS.....	35
1.5.4 SCOPING ISSUES ELIMINATED FROM DETAILED ANALYSIS.....	38
<b>CHAPTER 2. DESCRIPTION OF ALTERNATIVES.....</b>	<b>41</b>
2.1 INTRODUCTION.....	41
2.1.1 ALTERNATIVES ANALYZED.....	41
2.2 PAST AND EXISTING RESOURCE MANAGEMENT STRATEGIES AND PLANS.....	43
2.3 ALTERNATIVE 1 – NO ACTION ALTERNATIVE.....	44
2.4 ALTERNATIVE 2 – PROPOSED ACTION.....	45
2.4.1 DESCRIPTION OF PROPOSED ACTION.....	45
2.4.2. OPERATIONS PLAN AND OBJECTIVES.....	84
2.4.3 MITIGATION STRATEGIES FOR RESOURCE IMPACTS.....	85
2.5 ALTERNATIVES NOT CARRIED FORWARD FOR DETAILED ANALYSIS.....	91
2.5.1. TROPHIC-CASCADE – WOLVES DESIRED THROUGHOUT MONTANA.....	92
2.5.2 NO-MANAGEMENT – WOLVES ELIMINATED THROUGHOUT MONTANA.....	93
2.6. PROPOSED ACTION.....	94
<b>CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES.....</b>	<b>95</b>
3.1 INTRODUCTION.....	95
3.1.1 DEFINITIONS USED FOR IMPACTS ANALYSIS.....	95
3.1.2 RESOURCES ANALYZED AND CHAPTER ORGANIZATION.....	97
3.1.3 GENERAL SETTING OF AFFECTED ENVIRONMENT.....	101
3.1.4 ACTIONS CONSIDERED IN CUMULATIVE IMPACTS ANALYSIS.....	117
3.2 PHYSICAL ENVIRONMENT RESOURCE 1: TERRESTRIAL, AVIAN, AND AQUATIC LIFE AND HABITATS.....	121
3.2.1. INTRODUCTION.....	121
3.2.2 ENVIRONMENTAL CONSEQUENCES.....	122
3.3 PHYSICAL ENVIRONMENT RESOURCE 2: WATER QUALITY, QUANTITY AND DISTRIBUTION.....	128
3.3.1. INTRODUCTION.....	128

3.3.2 ENVIRONMENTAL CONSEQUENCES.....	128
3.4 PHYSICAL ENVIRONMENT RESOURCE 3: GEOLOGY, SOIL QUALITY, STABILITY, AND MOISTURE.....	130
3.4.1. INTRODUCTION.....	130
3.4.2 ENVIRONMENTAL CONSEQUENCES.....	131
3.5 PHYSICAL ENVIRONMENT RESOURCE 4: VEGETATION COVER, QUANTITY, AND QUALITY.....	133
3.5.1. INTRODUCTION.....	133
3.5.2 ENVIRONMENTAL CONSEQUENCES.....	133
3.6 PHYSICAL ENVIRONMENT RESOURCE 5: AESTHETICS.....	135
3.6.1. INTRODUCTION.....	135
3.6.2 ENVIRONMENTAL CONSEQUENCES.....	136
3.7 PHYSICAL ENVIRONMENT RESOURCE 6: AIR QUALITY.....	138
3.7.1. INTRODUCTION.....	138
3.7.2 ENVIRONMENTAL CONSEQUENCES.....	139
3.8 PHYSICAL ENVIRONMENT RESOURCE 7: UNIQUE, ENDANGERED, FRAGILE, OR LIMITED ENVIRONMENTAL RESOURCES.....	142
3.8.1. INTRODUCTION.....	142
3.8.2 ENVIRONMENTAL CONSEQUENCES.....	143
3.9 PHYSICAL ENVIRONMENT RESOURCE 8: HISTORICAL AND ARCHAEOLOGICAL SITES.....	148
3.9.1. INTRODUCTION.....	148
3.9.2 ENVIRONMENTAL CONSEQUENCES.....	149
3.10 PHYSICAL ENVIRONMENT RESOURCE 9: ENERGY USE.....	151
3.10.1. INTRODUCTION.....	151
3.10.2 ENVIRONMENTAL CONSEQUENCES.....	152
3.11 HUMAN POPULATION RESOURCE 10: SOCIAL STRUCTURES AND MORES.....	154
3.11.1. INTRODUCTION.....	154
3.11.2 ENVIRONMENTAL CONSEQUENCES.....	154
3.12 HUMAN POPULATION RESOURCE 11: CULTURAL UNIQUENESS AND DIVERSITY.....	157
3.12.1. INTRODUCTION.....	157
3.12.2 ENVIRONMENTAL CONSEQUENCES.....	158
3.13 HUMAN POPULATION RESOURCE 12: ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES.....	160
3.13.1. INTRODUCTION.....	160
3.13.2 ENVIRONMENTAL CONSEQUENCES.....	161
3.14 HUMAN POPULATION RESOURCE 13: LOCAL AND STATE TAX BASE AND TAX REVENUE.....	164
3.14.1. INTRODUCTION.....	164
3.14.2 ENVIRONMENTAL CONSEQUENCES.....	164
3.15 HUMAN POPULATION RESOURCE 14: AGRICULTURAL, INDUSTRIAL OR COMMERCIAL ACTIVITY AND PRODUCTION.....	167
3.15.1. INTRODUCTION.....	167
3.15.2 ENVIRONMENTAL CONSEQUENCES.....	168
3.16 HUMAN POPULATION RESOURCE 15: HUMAN HEALTH.....	170
3.16.1. INTRODUCTION.....	170
3.16.2 ENVIRONMENTAL CONSEQUENCES.....	171
3.17 HUMAN POPULATION RESOURCE 16: QUANTITY AND DISTRIBUTION OF EMPLOYMENT.....	173
3.17.1. INTRODUCTION.....	173

3.17.2 ENVIRONMENTAL CONSEQUENCES.....	173
3.18 HUMAN POPULATION RESOURCE 17: DEMANDS FOR GOVERNMENT SERVICES.....	176
3.18.1. INTRODUCTION.....	176
3.18.2 ENVIRONMENTAL CONSEQUENCES.....	176
3.19 HUMAN POPULATION RESOURCE 18: DISTRIBUTION AND DENSITY OF POPULATION AND HOUSING.....	178
3.19.1. INTRODUCTION.....	178
3.19.2 ENVIRONMENTAL CONSEQUENCES.....	179
3.20 HUMAN POPULATION RESOURCE 19: LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS.....	181
3.20.1. INTRODUCTION.....	181
3.20.2 ENVIRONMENTAL CONSEQUENCES.....	181
 CHAPTER 4. REGULATORY RESTRICTIONS.....	 184
4.1 REGULATORY RESTRICTIONS OF PRIVATE PROPERTY.....	184
 CHAPTER 5. COORDINATION AND CONSULTATION.....	 187
5.1 CONSULTATION PROCESS.....	187
5.1.1 PUBLIC COMMENT PROCESS.....	187
5.1.2 TRIBAL CONSULTATION.....	187
5.1.3 FEDERAL, STATE, AND LOCAL AGENCY CONSULTATION.....	187
5.2. DEIS DISTRIBUTION.....	190
 CHAPTER 6. LIST OF PREPARERS.....	 191
6.1 MONTANA FISH, WILDLIFE, AND PARKS.....	191
6.2. OTHER STATE, FEDERAL, AGENCY, AND TRIBAL PERSONNEL.....	192
 CHAPTER 7. REFERENCES.....	 193

# ABBREVIATIONS, ACRONYMS, & GLOSSARY OF TERMS

Abbreviation / Acronym	Definition
BIR	Blackfeet Indian Reservation
BLM	United States Department of the Interior Bureau of Land Management
CITES	Convention on International Trade in Endangered Species
CSKT	Confederated Salish and Kootenai Tribes
Commission	Montana Fish and Wildlife Commission; the appointed body charged with making policy and regulations for FWP
DNRC	Montana Department of Natural Resources and Conservation
EIS	Environmental Impact Statement (DEIS refers to the draft version of the document)
ESA	Endangered Species Act
FIR	Flathead Indian Reservation
FWP	Montana Fish, Wildlife & Parks; an agency of Montana state government.
GNP	Glacier National Park
GYA	Greater Yellowstone Area
MCA	Montana Codes Annotated
MDOL	Montana Department of Livestock
MEPA	Montana Environmental Policy Act
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NPS	United States Department of the Interior National Park Service
ROD	Record of decision, sometimes called a decision document; a concise public notice that announces a state agency decision arrived at through the Montana Environmental Policy Act, explains the reasons for the decision, and explains any special conditions surrounding the decision or its implementation.
SDM	Structured Decision Making. A formal process to help identify issues and make decisions, particularly amidst uncertainty.
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey (under which the Northern Rocky Mountain Science Center operates)
USFWS	United States Fish and Wildlife Service
WMA	Montana Fish, Wildlife & Parks Wildlife Management Area
WS	Wildlife Services, USDA
YNP	Yellowstone National Park

Term	Definition
<i>Adaptive management:</i>	A model for wolf conservation and management in which the number of wolf packs determines the appropriate management strategies; changes in the number of packs determined through a monitoring program directs selection of more conservative or liberal management strategies; model incorporates resource objectives, monitoring protocols, evaluation of predicted outcomes, and a decision process.
<i>Aggressive behavior:</i>	Behavior (defensive or offensive) that is threatening to people or property. Defensive behaviors can be associated with defense of itself, its young, or its food. Offensive behaviors can be related to overt attempts to obtain anthropogenic foods in the presence of people or active predation on people or property.
<i>Anthropogenic food:</i>	Foods or attractants having a human origin.
<i>Attractant:</i>	Anything that attracts a wolf to a site.
<i>Aversive conditioning:</i>	A learning process in which deterrents are continually and consistently administered to reduce the frequency of an undesirable behavior.
<i>Breeding pair:</i>	At least two adult wolves with at least two pups that survive to December 31.
<i>Compensation:</i>	Monetary payment to offset or replace the economic loss for a death or injury to livestock or guarding animals due to wolf activity; may also entail financial assistance to livestock producers to offset costs associated with modification to husbandry practices to reduce the potential for wolf-livestock conflicts.
<i>Conditioning:</i>	Learning triggered by receiving a reward or punishment for a given response to a given stimulus. Rewards of unsecured anthropogenic foods can lead to food-conditioning, whereby they learn to associate humans or their infrastructure with food. Although the characterization is usually used in a binary sense (i.e., either “conditioned” or not) because we typically lack both sufficient knowledge of the animal’s behavior and intentions and also because we lack a nuanced vocabulary for describing it, conditioning almost certainly exists along a continuum (from mild to severe).
<i>Conflict prevention:</i>	Strategies and actions that aim to deter or prevent wolves from obtaining anthropogenic foods, killing or injuring livestock, damaging property, or injuring people.

<p><i>Confirmed depredation:</i></p>	<p>Incident where WS conducts a field investigation of dead or injured livestock, at the request of the producer; depredation is confirmed in cases where there is reasonable physical evidence that an animal was attacked and or killed by a wolf. The primary confirmation would ordinarily be the presence of bite marks and associated subcutaneous hemorrhaging and tissue damage, indicating that the attack occurred while the victim was alive, as opposed to simply feeding on an already dead animal. Spacing between canine tooth punctures, feeding pattern on the carcass, fresh tracks, scat, hairs rubbed off on fences or brush, and or eye witness accounts of the attack may help identify the specific species or individual responsible for the depredation. Predation might also be confirmed in the absence of bite marks and associated hemorrhaging (i.e. if much of the carcass has already been consumed by the predator or scavengers) if there is other physical evidence to confirm predation on the live animal. This might include blood spilled or sprayed at a nearby attack site or other evidence of an attack or struggle. There may also be nearby remains of other victims for which there is still sufficient evidence to confirm predation, allowing reasonable inference of confirmed predation on the animal that has been largely consumed.</p>
<p><i>Defense of life/property:</i></p>	<p>Release from criminal liability for killing or injuring a wolf if the wolf is attacking, killing, or threatening to kill a person, livestock, or a domestic dog (MCA 87-6-106).</p>
<p><i>Delisting:</i></p>	<p>Removal of wolves from the list of “threatened or endangered” species that are managed by the USFWS under the ESA; delisting requires evaluation of current status of species compared to the delisting criteria with regard to habitat, over utilization, disease or predation, existing regulatory mechanisms, and other factors affecting the continued existence of the species; if the current status is secure in each of the 5 categories and the recovery criteria are met, a species is delisted and managed by the state or tribal fish and wildlife management authority.</p>
<p><i>Depredation:</i></p>	<p>An action generally associated with the killing of domestic livestock animals.</p>
<p><i>Ecosystem:</i></p>	<p>Use of this technical term recognizes the complex and, sometimes, unique interactions of many living and non-living components within large landscapes. In this document, reference to an ecosystem refers to the general area occupied by the resident wolf population.</p>

<i>Extirpate:</i>	In population biology, this term typically means to eliminate locally. An entire species could be said to be “extinct” (e.g., the passenger pigeon, <i>Ectopistes migratorius</i> ); in contrast, we’d characterize wolves in Montana to have once been “extirpated.”
<i>Guarding animals:</i>	Domestic animals (e.g., dogs, llamas) that escort livestock to decrease likelihood of a depredation incident by aggressively defending livestock in the presence of wolves or other predators.
<i>Habituation:</i>	The waning of an innate response to a stimulus after repeated or prolonged presentations of that stimulus. Animals that are continually exposed to humans, with no negative consequences, can lose their innate avoidance behavior and become habituated or more precisely human-habituated. Although the characterization is usually used in a binary sense (i.e., either “habituated” or not) because we typically lack both sufficient knowledge of the animals’ behavior and intentions and also because we lack a nuanced vocabulary for describing it, habituation almost certainly exists along a continuum (from mild to severe).
<i>Hazing:</i>	A technique where deterrents are administered to immediately modify the undesirable behavior.
<i>Illegal mortality:</i>	Mortality outside the provisions of a special kill permit, defense of life or property, agency management actions, a commission approved season, or outside other regulations established for wolves as a legally classified “species in need of management.”
<i>Legal mortality:</i>	Lethal control or mortality of a wolf within the provisions of a special kill permit, defense of life or property, agency management actions, a commission-approved season, or the regulations established for wolves as a legally classified “species in need of management.”
<i>Lethal control:</i>	Management actions that result in the death of a wolf.
<i>Livestock:</i>	Cattle, calf, hog, pig, horse, mule, sheep, lamb, goat, guarding animals, emu, ostrich, poultry.

<i>Management</i>	The collection and application of biological information for the purposes of increasing the number of individuals within species and populations of wildlife, up to the optimum carrying capacity of their habitat, and maintaining such levels. The term includes the entire range of activities that constitute a modern scientific resource program including but not limited to research, census, law enforcement, habitat improvement, and education. Also included within the term, when and where appropriate, is the periodic or total protection of species or populations as well as regulated taking (MCA 87-5-102).
<i>Management removal:</i>	Lethal or non-lethal removal of an animal from the population by or at the direction of management personnel.
<i>Management setting:</i>	The combination of landownership patterns, land use, social factors, biological constraints, and physical attributes of the environment that describe a particular area or management situation.
<i>Non-lethal control:</i>	A variety of management activities intended to avert or resolve a conflict situation without killing the wolf or wolves in question; examples include non-lethal harassment to disrupt or interrupt wolf behaviors, frightening a wolf, monitoring of wolf location or using radio telemetry.
<i>Non-lethal harassment:</i>	An example of non-lethal control where a wolf is frightened or threatened, but is not mortally wounded or killed; purpose is to discourage wolf activity near people or livestock; examples yelling, radio-activated noise-makers, or firearms which discharge cracker shells.
<i>Pack:</i>	Used generically to mean a group of wolves holding a territory and capable of reproduction; more specific definitions are social group and breeding pair.
<i>Probable depredation:</i>	Incident where WS conducts a field investigation of dead or injured livestock, at the request of the producer; having some evidence to suggest possible predation, but lacking sufficient evidence to clearly confirm predation by a particular species, a kill may be classified as probable depending on a number of other factors such as (1) has there been any recently confirmed predation by the suspected depredating species in the same or nearby area? (2) How recently had the livestock owner or his employees observed the livestock? (3) Is there evidence (telemetry monitoring data, sightings, howling, fresh tracks etc.) to suggest that the suspected depredating species may have been in the area when the depredation occurred? All of these factors, and possibly others, should be considered in the investigator's best professional judgment.
<i>Problem wolf:</i>	Wolf that has attacked livestock, or is a nuisance animal that could potentially compromise human safety.

<i>Public safety problem or threat:</i>	Any situation where the continued presence of a carnivore poses a threat to human safety; or, an attack has resulted in the loss of livestock or personal pets; or a human has been physically injured or killed.
<i>Recovery goal:</i>	A total of 30 breeding pairs with equitable distribution throughout Montana, Idaho, and Wyoming for three successive years; breeding pair is defined as at least two adult wolves with at least two pups that survive to December 31; when the recovery goal was met, the USFWS initiated the process to remove wolves from the list of threatened and endangered species protected by the ESA.
<i>Relisting:</i>	Placing the a species back on the federal list of threatened or endangered species protected by the ESA; relisting criteria may or may not be similar to delisting criteria; relisting requires evaluation of current status of species compared to criteria with regard to habitat, over utilization, disease or predation, existing regulatory mechanisms, and other factors affecting the continued existence of the species; if current status is not secure with regard to the 5 areas, a species may be relisted.
<i>Regulated public harvest:</i>	Category of legal of wolf mortality where wolves are killed under commission-approved seasons and regulations by licensed hunters or trappers; total harvest strictly controlled through permit or quota system; law enforcement as for other managed species.
<i>Removal:</i>	Capture and either lethal removal or placement of an animal in an authorized zoological or research facility.
<i>Social group:</i>	A more specific definition of a wolf pack; in this document social group is defined as four or more wolves traveling in winter which is holding a territory and capable of reproduction.
<i>Special kill permit:</i>	Written authorization granted to a property owner by FWP to kill or destroy a specified number of animals causing damage to private property; permits are only valid under a specific set of conditions or criteria.

<i>Species in need of management:</i>	Legal classification of nongame species that are designated by FWP as needing special management regulations; FWP, by regulation, establishes the limitations relating to taking, possession, transportation, exportation, processing, sale or offer for sale, or shipment considered necessary to manage nongame wildlife; Except as provided in regulations issued by the Department, it is unlawful for any person to take, possess, transport, export, sell, or offer for sale species designated by FWP as “in need of management” (MCA 87-5-131).
<i>Take:</i>	To harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill wildlife.
<i>Tri-state area:</i>	States of Montana, Idaho, and Wyoming, making up the NRM wolf recovery area.
<i>Unconfirmed:</i>	Incident where WS conducts a field investigation of dead or injured livestock, at the request of the producer; lacking sufficient evidence to classify an incident as depredation in contrast to other possible causes of death, it is classified as unconfirmed; it is unclear what the cause of death may have been. The investigator may or may not have much of a carcass remaining for inspection, or the carcass may have deteriorated so as to be of no use; in the context of wolf management, cause of death is attributed to a cause other than wolf predation.
<i>Undocumented:</i>	Livestock losses for which there is no apparent explanation for the loss; usually in the context of a numerical discrepancy between the number of livestock head at the beginning of the grazing season and what is retrieved at the end of the grazing season; evidence documenting a death is usually not found.
<i>Wolf-human conflict:</i>	Where a public safety problem develops; a situation where an FWP employee reasonably determines that the continued presence poses a threat to human safety, an attack has resulted in the loss of livestock or personal pets, or that a human has been physically injured or killed.
<i>Wolf-livestock conflict:</i>	Where a wolf or wolves are loitering, testing, worrying, or otherwise disrupting livestock; also, a situation where a wolf is suspected to have killed or injured livestock or guarding animals.

# CHAPTER 1. OVERVIEW

## 1.1 INTRODUCTION

This Draft Environmental Impact Statement (DEIS) has been prepared by Montana Fish, Wildlife, & Parks (FWP) to analyze and disclose potential impacts of the proposed Statewide Wolf Management Plan on the human environment. Gray wolves (*Canis lupus*; hereafter, wolves) in Montana are native, iconic carnivores that have high value to people and cultures across the state and play important roles in Montana ecosystems. At the same time, they can injure or kill livestock, as well as cause property damage and economic loss, which may disproportionately affect certain individuals. Additionally, wolves contribute to top-down effects within the ecological community, potentially impacting prey population dynamics, densities, and distributions.

Wolf recovery in Montana began in the early 1980s via natural immigration from Canada. In 1995 and 1996 wolves were reintroduced into central Idaho and Yellowstone National Park (YNP) by the United States Fish and Wildlife Service (USFWS). Wolves were not released within Montana, but wolf populations in YNP and central Idaho grew rapidly and soon became a source of dispersers to Montana via natural emigration. New packs formed outside the earliest core wolf areas and overall wolf distribution expanded. Wolf dispersal has been documented between and among populations in the Northern Rocky Mountains (NRM) including those in Montana, Idaho and Wyoming. From 1974–2011 (with a gap in 2009 when wolves were first briefly delisted), the USFWS has managed wolves in the US, under the authority of the ESA, as either “endangered” or “experimental, nonessential.” The federal wolf recovery goal of 30 breeding pairs, defined as an adult male and female wolf that have produced at least two pups that survived to December 31, for 3 consecutive years in the NRM of Montana, Idaho and Wyoming (i.e., 10 breeding pairs and 100 individuals in each recovery area: NW Montana, central Idaho, and Greater Yellowstone) and all other necessary criteria for delisting were met by 2002. In 2003, FWP developed the existing Wolf Management Plan (2003 Wolf Plan) and an associated EIS to analyze potential impacts to the human environment. The USFWS approved the 2003 Wolf Plan, and in 2004, with the amended and approved record of decision for the 2003 Wolf Plan and EIS, wolf management in Montana was delegated to FWP and FWP began day to day monitoring and management of wolves (excluding harvest). Hunting and harvesting of wolves remained outside the scope of wolf management while wolves were still listed on the ESA and under ultimate authority of the USFWS. Wolves were delisted in Montana in May 2011 and have been managed under state authority since that time (ongoing annual reporting to the USFWS was required as part of the post-delisting monitoring plan from 2011–2016).

Since then, new, and improved management approaches and tools have been developed and new science about wolf ecology has emerged. Although not specifically described in the 2003 Wolf Plan, these new management approaches, tools, and science have been incorporated into Montana’s comprehensive wolf management strategy. Governor Gianforte directed FWP to develop a new Wolf Plan, to include more contemporaneous information on how wolves are managed in Montana. The 2023 Montana Gray Wolf Conservation and Management Plan (2023 Wolf Plan) assures the continuance of sound science-based methodologies. The 2023 Wolf Plan articulates updates in wolf-related research, describes new and available wolf management tools and methods employed by FWP, provides FWP with the flexibility needed to incorporate new science and tools as they become available and practical to implement, ensures continued public transparency related to wolf management practices in Montana,

describes the public engagement process, and reflects new and existing laws, regulations, and policies, as well as inter-governmental commitments made by FWP and the Montana Fish and Wildlife Commission (hereafter, commission). The 2023 Wolf Plan affords FWP biologists and managers flexibility to manage wolves as their density and distribution changes on the landscape in response to varying human-caused mortality, environmental factors, human development, and prey availability, as well as to contextual changes in the sociopolitical climate.

This DEIS discloses the potential direct, secondary, and cumulative environmental impacts that would result from the proposed project and alternatives. The document is organized into eight chapters:

- Executive Summary – The summary provides a brief overview of the proposed project, project alternatives, and impacts. It also includes a list of acronyms, a glossary, and the table of contents.
- Chapter 1. Overview – Chapter 1 includes a background and overview of the proposed project; the purpose, need, and benefits of the proposed project; FWP roles, responsibilities, and decisions; an overview of public notice and participation; and identification of the key issues identified through public scoping.
- Chapter 2. Description of Alternatives – Chapter 2 describes existing conditions and provides a detailed description of the proposed action (Alternative 2) as well as the No Action Alternative (Alternative 1). Chapter 2 also includes a description of alternatives that were considered but not carried forward for detailed analysis, for cause.
- Chapter 3. Affected Environment and Environmental Consequences – Chapter 3 describes the existing conditions and analysis areas used for the resource-specific impacts analyses; discloses the direct, secondary, and cumulative environmental impacts of implementing the Proposed Action of adopting and implementing either the statewide plan or the No Action alternative; and discloses irreversible and irretrievable commitments of resources.
- Chapter 4. Regulatory Restrictions – Chapter 4 includes a Regulatory Restriction Analysis pursuant to 75-1-201(3)(iii), MCA, which is an analysis of impacts on private property rights and whether alternatives that reduce, minimize, or eliminate the regulation of those rights have been identified and analyzed.
- Chapter 5. Coordination and Consultation – Chapter 5 provides a list of preparers and agencies consulted during the development of the DEIS and describes consultation with Indian tribes.
- Chapter 6. List of Preparers – Chapter 6 provides the names and credentials of FWP specialists and third-party consultants.
- Chapter 7. References – Chapter 7 includes a list of references cited in the analysis.
- Chapter 8. Appendices – Chapter 8 provides appendices as referenced in the document. The following appendices provide more detailed information to support the analyses presented:

## 1.2 PROJECT BACKGROUND

FWP proposes to manage wolves within the state of Montana under the guidance of the 2023 Wolf Plan. Through MEPA review and more specifically the Environmental Impact Statement (EIS) process, FWP determined the Montana Gray Wolf Conservation and Management Plan (2023 Wolf Plan) is consistent with commitments made by existing agreements with federal, state, and tribal agencies. The foundations of the 2023 Wolf Plan are to recognize wolves as part of Montana's wildlife heritage, to approach wolf management similar to other wildlife species, to manage with flexibility, and to address and resolve conflicts. The 2023 Wolf Plan does not preempt the commission's authority to formulate annual rules, set hunting and trapping season regulations, or implement emergency actions in response to unexpected events or circumstances. Whereas the commission cannot modify the 2023 Wolf Plan per se, it does have statutory authority to evaluate and modify how certain elements of the 2023 Wolf Plan are implemented.

### 1.2.1 ECOLOGY

Mech and Boitani (2003) and Boyd et al. (2023) were key scientifically-reviewed references used as a resource for basic information on wolf characteristics, ecology, and behavior described in this section.

#### Physical Characteristics

Wolves are mammals that belong to the family Canidae, which includes coyotes, fox, and domestic dogs. Wolves may resemble coyotes, particularly when wolves are young. Wolves may also be confused with some large domestic dog breeds. In many instances, skull morphometrics, genetic data, or behavioral data are used to distinguish wild wolves from wolf-dog hybrids and domestic dogs (Boyd et al. 2001, Duman 2001). Wolves are typically gray or black and both color phases may be found in a pack or in one litter of pups. On average, adult male wolves, in Montana, weigh 80–110 pounds, and adult females weigh 75–90 pounds, although individuals can be smaller or larger than these averages. Full-grown wolves are about 2.5 feet tall and 6 feet long. Their tracks are normally 4.5–5.5 inches long.

#### Pack Size

Wolves are highly social predators and mostly live in packs. However, 10–15% of wolf populations are comprised of lone or dispersing wolves (Fuller et al. 2003, Holyan et al. 2013). Packs are formed when male and female wolves develop a reproductive bond, breed, and produce pups. Each pack typically consists of a socially dominant breeding pair, defined as an adult male and a female wolf that have produced at least 2 pups that survived until December 31, offspring from the previous 1–2 years, and new pups of the current year (Montana Wolf Conservation and Management Planning Document 2002). Other breeding-aged adults may be present in a pack, and they may or may not be related to the others. Wolf packs display cooperative behavior, regularly hunting, feeding, traveling, and resting together. The pack members also share pup-rearing responsibilities like tending to pups at the den or at a series of rendezvous sites.

Breeder loss due to human-caused mortality leads to an increased probability of pack dissolution, decreased denning and recruitment rates (i.e., pack persistence and reproduction, Brainerd et al. 2008, Cassidy et al. 2023), as well as the potential for the loss of learned behaviors within the pack (Haber

2013). Although there may be impacts to within-pack dynamics associated with level of harvest (i.e., potential for reduced pack size which may negatively influence dependent biological processes; Cassidy et al. 2023), the abundance and distribution of packs in a population usually remains stable (Borg et al. 2014, Bassing 2017). Ausband et al. (2017) found that harvest was not associated with frequency of breeder turnover or number of breeders in a pack. Pack size is highly variable across landscapes and states, ranging from as few as three to as many as 37 individuals (USFWS et al. 2001). In Montana, annual mean group size ranges from 4.86–7.03 with an overall average of 5.92, where most groups are relatively small with  $\leq 8$  members. Pack size is positively associated with local wolf density and prey density, and negatively associated with harvest intensity (Sells et al. 2022a).

## **Reproduction**

Wolves normally do not breed until at least 22 months of age (Mech 1970). On average, first reproduction occurs between 2–3 years of age, and age at first reproduction is influenced by population size and rate of inbreeding (Wikenros et al. 2021). Reproductive success has been found to be influenced by the presence of helpers in the pack (i.e., conspecifics; Solomon and French 1997, Sparkman et al. 2010, Stahler et al. 2013, Ausband et al. 2017), distance from wolf dens to prey migration routes (Frame et al. 2007), wolf density (Hayes and Harestad 2000, Gude et al. 2012, Stenglein et al. 2015), ungulate biomass (Boertje and Stephenson 1992, Huggard 1993, Post et al. 1999, Mech and Peterson 2003), and landscape (Llaneza et al. 2012, Rich et al. 2013, Bassing et al. 2019) and environmental characteristics (Mech 1970, Peterson 1974, Mech et al. 1998, Mech and Fieberg 2015). In the NRM, the breeding season peaks in mid- to late February (Boyd et al. 1993). Wolves localize their movements around a den site prior to pupping, have a 63-day gestation period, and whelp in late March to late April. After the pups are about eight weeks old, they are moved to a series of rendezvous sites, which are defined as gathering sites primarily used for pup rearing during the summer.

In northwestern Montana, litter size averaged 5.3 (range 1–9; Pletscher et al. 1997), and most litters contain 4–6 pups (Sells et al. 2020). Litter size is often associated with prey resource availability and wolf density (Harrington et al. 1983, Roffler et al. 2023). Pup survival is highly variable and influenced by several factors, including disease, predation, prey availability (Harrington et al. 1983, Mech and Goyal 1993, Johnson et al. 1994), and diets at natal den sites (Roffler et al. 2023). Typically, pup survival is high with mortality attributed to both human or natural causes (Pletscher et al. 1997, Bangs et al. 1998, Smith et al. 2000, Mills et al. 2008), and heavily dependent on pack member provisioning of food (Packard et al. 2003, Ruprecht et al. 2012). Mean recruitment rate of pups to 5 months of age in Montana ranged from 3.25–4.21 wolves per pack, whereas mean recruitment rate to 17 months of age ranged from 1.40–3.06 wolves per pack (Sells et al. 2020).

## **Food Habits**

Wolves are opportunistic carnivores and adapted to hunt large and medium-sized prey species, typically wild ungulates. Wolves may also prey on smaller species (Stahler et al. 2006), scavenge carrion or even eat vegetation; diet composition in different territories and times of the year depends on the relative abundance and distribution of available prey (Newsome et al. 2016). White-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*) and moose (*Alces alces*) make up the majority of wolf diets (Mech and Peterson 2003, Peterson and Ciucci 2003). By switching among prey species, wolves are insulated from fluctuations in prey availability of a single species (Cupples 2013). In northwestern Montana, white-tailed deer comprised most of wolf kills compared to elk and

moose (Kunkel et al. 1999, Derbridge 2010), however the proportion of moose consumed by wolves was greater than predicted (Derbridge et al. 2012). Wolf kills in Yellowstone National Park (hereafter, YNP) are dominated by elk (Smith et al. 2000, 2004, Hamlin and Cunningham 2009, Metz et al. 2012). Similar findings in replicated studies have verified that wolves in Montana eat elk when available in high densities, and otherwise eat mostly deer (Garrott et al. 2007, Cascaddan 2016).

Neonates are often an important food source in early summer (Garrott et al. 2008), with diversity of prey increasing as summer progresses to include smaller prey items, vegetation, and adult ungulates. Carrion becomes a contributor to wolf diet during hunting seasons with gut piles and carcasses left on the landscape (Gable et al. 2018). Similarly, wolves also scavenge opportunistically on vehicle-killed ungulates, winterkill, and on kills made by other carnivores, particularly mountain lions. In areas with high coyote densities, prey resource partitioning occurs with wolves focusing on larger prey (Arjo et al. 2002). Wolves also kill and feed upon domestic livestock such as cattle, sheep, llamas, horses, or goats (Morehouse and Boyce 2011). They may also kill domestic dogs but usually do not feed on the carcass.

### **Movements and Territories**

A pack establishes an annual home range or territory and defends it year-round (Mech and Boitani 2003) through howling, scent marking, and conspecific aggression (Harrington and Mech 1979, Cassidy et al. 2017). The pack hunts and raises pups within the territory. Pack territory boundaries and sizes may vary from year to year based on environmental conditions, food resource availability and accessibility, and wolf density (i.e., conflict with conspecifics; White et al. 1996). Because the attributes of each pack's territory are so unique (elevations, land use, land ownership patterns, prey species present and relative abundance), it is difficult to generalize about wolf territories and movements. Wolves maintain a territory influenced by food, competition, and mortality risk. For example, smaller territories are a result of greater food abundance (i.e., greater ungulate densities), competitor density, pack size, and density of low-use roads. Territory size often increases before decreasing in response to terrain ruggedness, harvest mortalities, and greater levels of mortality risk (Sells et al. 2020). As a result, pack boundaries and territory sizes may vary spatiotemporally. Central-based foraging with non-breeders hunting and returning to den and rendezvous sites with food for pups often occurs in the summer, whereas nomadism of the pack often occurs in the winter.

After recolonizing the Glacier National Park (hereafter, GNP) area in the 1980s, individual wolves dispersed and established new packs and territories on a variety of property ownerships and land uses. Wolves demonstrated a greater tolerance of human presence and disturbance than previously thought characteristic of the species, colonizing an array of landscapes including rural development. Early in their recovery, it was predicted that wolves would occupy high elevation public lands (Fritts et al. 1994). While this was true for some packs, many preferred lower elevation and gentler terrain likely because of concentrations of wintering ungulates (Boyd-Heger 1997). As a result, wolves disproportionately occupied areas with higher prey abundance, which are also used for livestock production, thereby providing opportunity for wolves to kill livestock where the wild and domestic prey items overlap, thus increasing conflict potential.

The earliest colonizing wolves had large territories. Ream et al. (1991) reported an average of 460 square miles (mi<sup>2</sup>), but average territory size decreased as wolf numbers and density increased and new territories filled in suitable, unoccupied habitat. Recent studies have found wolf territory establishment is economical, to maximizing benefits and reducing costs associated with maintaining a territory.

Territories are smaller for packs with a larger group size and in areas with greater densities of competitors, prey, and low use roads. Larger territories are associated with increasing harvest mortalities and terrain ruggedness (Sells and Mitchell 2020, Sells et al. 2021). In 1999, in the Northwestern Montana Recovery Area, the average territory size was 185 mi<sup>2</sup> (8 packs). Territories in the Greater Yellowstone Area (hereafter, GYA) were larger, averaging 344 mi<sup>2</sup> (11 packs). Individual pack territories ranged from 33 to 934 mi<sup>2</sup>. Individual territories were highly variable in size (USFWS et al. 2000). In Montana, mean territory size has stabilized at about 175 mi<sup>2</sup> (Sells et al. 2020).

## **Dispersal**

When wolves reach sexual maturity (1–2 years of age), some remain with their natal pack while others leave, looking for a mate to start a new pack of their own (Mech and Boitani 2003). Dispersal may be to nearby unoccupied habitat near their natal pack's territory, or it may entail traveling several hundred miles before locating vacant habitat, a mate, or joining another pack. Dispersing wolves use scent-marking behavior and howling to locate other wolves, and frequently use similar travel paths. Dispersal is more common for males than females and for adults than yearlings. Males often have longer dispersal distances than females. About 10–15% of wolves disperse annually (Fuller et al. 2003, Holyan et al. 2013). Dispersal occurs year-round, but peaks with courtship and the breeding season in February and March. Wolves that formed new packs were more likely to reproduce compared to those that joined an already existing pack. Similarly, success of dispersal increased with decreased pack densities (Jimenez et al. 2017).

Dispersal averaged 60 mi (range 10–158 mi) and mean duration averaged 5.5 months (Boyd and Pletscher 1999, Jimenez et al. 2017). This played an important role during recovery, influencing the expansion of wolves across the state and larger NRM landscape (Boyd et al. 1995, Bangs et al. 1998, Smith et al. 2000, USFWS et al. 2000). There is large variability of dispersal age and rate, direction, distance, duration, and success due to multiple individual, social and environmental determinants. Dispersal rate is higher at low and high population densities, and human-caused mortality reduces distance, duration, and success of dispersal events, with wolves often avoiding interaction with anthropogenic landscape features (Morales-Gonzalez et al. 2021). Prey abundance, availability of vacant territories, and survival rates of breeding wolves also influence dispersal rates and success. For example, as the population grows, dispersal toward areas with higher wolf densities than that found in their natal areas (i.e., greater pack sizes or greater number of packs) is common (Boyd and Pletscher 1999, Jimenez et al. 2017). Lone wolves are often separated from total population counts because the pack is the mechanism by which wolves reproduce and populations grow, and packs are far easier to locate and monitor than individual or dispersing wolves.

## **Mortality**

Wolves die from a variety of natural and human causes. Naturally caused mortalities result from territorial conflicts between packs, injuries while hunting prey, old age, disease, starvation, or vehicle collisions. However, in the NRM, outside of national parks, natural mortality is unlikely to regulate populations. Humans are the largest cause of wolf mortality and the only cause that can significantly affect populations at recovery levels (USFWS 2000, Murray et al. 2010). Human-caused mortality includes control actions to resolve conflicts, legal harvest, poaching, and vehicular collisions. Further, human-caused mortality rates have increased with wolf population growth, although wolf populations have been documented to remain stable when human-caused mortality is between 15–48% (Keith 1983,

Fuller 1989, Fuller et al. 2003, Adams et al. 2010, Creel and Rotella 2010, Gude et al. 2012). Based on a subjective analysis of what would be socially acceptable, a more conservative percentage harvested from the population has been recommended by Smith et al. (2016; 5–7% of the YNP wolf population each year, and no more than 20% in any given pack) within protected areas. Wolves in closer proximity to human development exhibit lower survival due to increased risk of harvest, poaching, and livestock-conflict (Murray et al. 2010, Barber-Meyer et al. 2021). Legal harvest accounts for most mortality in Montana (Sells et al. 2020). Poaching is a cause of mortality for wolves world-wide and generally increases when and where hunting of other species is occurring (Santiago-Avila and Treves 2022), particularly in areas where the harvest of wolves is or was recently prohibited (Chapron and Treves 2016). However, this is not a leading cause of mortality in Montana (Parks et al. 2023). While canid diseases may threaten pup survival in some areas, diseases and parasites are negligible in impacting wolf populations in the NRM to date (USFWS 2000). Adult survival rates vary annually and are greatest during years without harvest (70% compared to 50%). Nevertheless, seasonal wolf survival during hunting and trapping seasons was high during years with legal harvest (74%; Inman et al. 2021).

## Genetics

The application of genetic techniques to the study of wildlife populations permits managers to address issues of genetic diversity and population viability. Various genetic projects have yielded information relevant to wolf conservation and management in the NRM. Wolf recovery advanced due to the combination of natural recolonization of northwestern Montana by wolves from Canada, and the reintroduction of wolves into YNP and central Idaho. In northwestern Montana, the initial founding population was small, and inbreeding among closely related individuals was possible. Fortunately, genetic variation among the first colonizers was high (Forbes and Boyd 1996), and ongoing natural dispersal to and from Canadian wolf populations was adequate to minimize close inbreeding and assure long-term population viability. There were similar concerns about inbreeding and lack of genetic variation for the relatively small founding population reintroduced to YNP and central Idaho, but research showed that genetic variation among reintroduced wolves (and the source populations from which they came) was also high (Forbes and Boyd 1997). Overall, genetic diversity was similar among samples of wolf population founded by natural recolonization, reintroduced individuals, and the Canadian source populations. Because wolf packs in the NRM are demographically and genetically connected by high rates of long-distance dispersal (Mech and Boitani 2003, Bassing et al. 2020), loss of genetic variation and potential inbreeding depression is highly unlikely under current conditions (i.e., large population size with high connectivity). However, wolves are prone to close-inbreeding and inbreeding depression when isolated (e.g., see Hoy et al. 2023), emphasizing that dispersal and gene flow between subpopulations is critical for maintaining the genetic viability of wolves in the NRM.

With wolf distribution broadly distributed across Montana and high-rates of individual dispersal among packs, the population is sufficiently connected to maintain genetic viability and diversity (e.g., vonHoldt et al. 2010, Jimenez et al. 2017, Hendricks et al. 2019). FWP has a MOU with other NRM states and the USFWS to maintain consistent monitoring of wolf genetics to ensure that functional connectivity and genetic variation do not decline. A recent genetic analysis of wolves (excluding Mexican wolves) across occupied range in the western United States led by the USFWS found that current genetic diversity is

high, and the wolf population is well-mixed across the western United States (Paetkau 2022). Inter-state collaborations and analysis on wolf genetics may occur under an updated MOU in the future.

## **Population Growth**

Wolf populations increase or decrease through the combination and interaction of mortality, wolf densities (i.e., competition and conflict with conspecifics) and prey densities (i.e., food resource availability and accessibility), among a variety of other environmental and landscape factors. The degree and type of legal protection, agency control actions, and regulated harvest also influence the amount of human-caused mortality and therefore population trends. Significant declines in wild prey availability often result in increased livestock depredation events (Jedrzejewski et al., 2000, Gula, 2004, Mech and Peterson, 2003, Klich et al. 2021), and, consequently, potential lethal removal. Availability of suitable, vacant habitat will influence dispersal and population growth rates. Once established, wolf populations can withstand human-caused mortality rates up to about 15–48% of the mid-winter population (Keith 1983, Fuller 1989, Fuller et al. 2003, Adams et al. 2010, Creel and Rotella 2010, Gude et al. 2012). In Montana, population growth rates were highest during population recovery and expansion and have since declined and stabilized. Observed decreases in measured recruitment rates may also be artificial effects of monitoring capabilities because of difficulty in documenting reproductive rates in a large population size (Gude et al. 2012). Population growth of wolves in Montana has been stable in recent years (Parks et al. 2023).

## **Interactions with Other Species**

The relationships between carnivores and other species, and the ecosystems in which they live, is extremely complex and dependent on ecological, environmental, and landscape factors (Estes 1996). Despite volumes of published literature on wolves, there is limited evidence of the precise nature, degree, and mechanisms by which wolves affect ecosystems via cascading effects across trophic levels (i.e., trophic-cascades; Silliman and Angelini 2012, Hale and Koprowski 2018). Density-dependent factors (Kauffman et al. 2010), weather and climate change (Despain 2005), and independent population dynamics of other species (Wolf et al. 2007, Bilyeu et al. 2008) also influence prey population fluctuations.

Ungulate populations are influenced by a combination of top-down effects, such as predation and legal harvest, and bottom-up factors, such as habitat and climate (Crête 1999, Griffin et al. 2011, Johnson et al. 2013). There are many non-predation related mechanisms (e.g., disease, intensity of harvest, environmental conditions, habitat changes) that drive declines in ungulate populations (Vucetich et al. 2005, White and Garrott 2005, Wright et al. 2006, Middleton 2012). Some of these factors can be confounded with predation and affect conclusions about whether wolf predation is additive versus compensatory mortality (Melis et al. 2009, White et al. 2010). Prey populations well below the carrying capacity may be more at risk of being limited by predation, and these populations seem to respond best to predator removal efforts (Ballard et al. 2001). Severe winter or drought conditions, in combination with predation effects, can result in prey population declines and difficulty in population rebounds. A commonly documented example is increased predation rates and elk (adult and calf) mortality associated with increased snow depth (Barber-Meyer et al. 2008, Brodie et al. 2013, Horne et al. 2019). However, it is difficult to determine if ungulates are increasingly vulnerable to predation or if they experience decreased fitness due to energy loss and food stress (Hebblewhite et al. 2002, Hebblewhite 2005, Hamlin and Cunningham 2009, Middleton 2012, Pierce et al. 2012). Wolves typically occur with

other predators, and predator guild composition and densities influence the degree of susceptibility of prey species and effects of predation on prey population dynamics differently (Barber-Meyer et al. 2008, Hamlin et al. 2009, White et al. 2010, Griffin et al. 2011). Limitation of ungulate populations by predation is often associated with a reduction in recruitment or the survival of young, and wolf predation has been associated with limited elk recruitment when they occur with other large carnivores (Hamlin et al. 2009, Griffin et al. 2011, Proffitt et al. 2014) and in habitats with nutritional limitation (Garrott et al. 2008). When combined with low recruitment, human harvest of adult female ungulates can lead to population declines or limitation (e.g., Vucetich et al. 2005, White and Garrott 2005, Wright et al. 2006) and changes to population structure and distribution (White et al. 2010). For this reason, the opportunity for antlerless hunting by humans is often reduced in areas with established wolf populations. However, the impact of wolf predation on prey populations varies and can be minimal for some species and in some situations. For example, mortality rates of adult female mule deer due to wolves in northwestern Montana were relatively low (1–3%; DeCesare et al. 2021). Similarly, wolf predation was not an important factor limiting elk recruitment in western Montana’s Bitterroot Valley (Eacker et al. 2016, Rotella et al. 2020). Wolves are the most common predator associated with predation-caused mortality of adult female moose across Montana, but the sum of all predation-related mortality is lower than that due to health-related causes (e.g., parasites of malnutrition; DeCesare et al. 2022). Predator control has positive but variable results in increasing recruitment or size of some prey populations (Clark and Hebblewhite 2020), but prey populations at carrying capacity generally do not increase with predator removal (Ballard et al. 2001).

Wolves often select more vulnerable individuals (i.e., physically disadvantaged and older- or younger-aged prey) that might otherwise succumb to natural causes of mortality (Husseman et al. 2003, Vucetich et al. 2005, Atwood et al. 2007, Barber-Meyer et al. 2008, Metz et al. 2012). Additionally, in a resource-poor context, wolf predation may be compensatory with mortalities caused by nutritional deficiencies or starvation (Barber-Meyer et al. 2008, Garrott et al. 2009). Wolves may cull sick, weak, or crippled animals (including those belonging to livestock herds), and thereby may also assist in reducing the prevalence and spread of diseases (e.g., chronic wasting disease; Wild et al. 2011), but this is heavily dependent on predator selectivity of diseased prey, densities and composition of prey species, demography and body condition of prey, as well as age-specific infection rates (Brandell et al. 2022). For predators to have a significant influence on disease transmission and spread, the level of selection for diseased individuals and predation rate would have to occur at higher levels than currently documented and would likely cause intolerable declines in prey populations. Regardless of wolf impacts on prey populations, they do kill ungulate prey year-round. A wide variety of scavengers and other carnivores benefit from carrion being readily available from wolf kills year-round, rather than just a pulse in the early spring because of winterkill (Stahler et al. 2001, Wilmers et al. 2003).

Wolves may directly or indirectly compete for food with other carnivores by selecting similar prey, or by usurping kills (Kunkel et al. 1999, Arjo et al. 2002). Intraguild predation and antagonistic encounters involving wolves are common (Ballard et al. 2003, Akenson et al. 2005, Donadio and Buskirk 2006, Kortello et al. 2007, Ruth and Murphy 2010). Because wolves are socially cooperative, they often dominate interactions with other solitary carnivores. For example, wolves may have direct and indirect effects of competition with mountain lions, negatively influencing their survival and abundance (Elbroch et al. 2018). Interactions between large carnivores and the effects of those interactions on ungulate predation rates are complex (Atwood et al. 2007, Elbroch et al. 2015, Elbroch et al. 2020, Tallian et al. 2021). Examples of wolf populations negatively influencing coyote densities are also well documented

(Crabtree and Sheldon 1999, Berger and Gese 2007, Berger et al. 2008, Hebblewhite and Smith 2009), thereby perhaps relieving pressure on other mesocarnivores or small mammal populations.

Wolves may indirectly influence the behavior of prey populations, specifically ungulate resource selection, herd size, movement rates, and migration route in response to predation risk (Cupples 2013). This predator-prey interaction may force prey populations to occupy poor quality habitat with limited forage or nutrition, thereby reducing fitness (Creel et al. 2009). Ungulates may select for steeper terrain or open landscapes they perceive as means of protection from predation that were ultimately characteristics of ecological traps (Kauffman et al. 2007). Some herds have abandoned their migration to summer range or fawn- or calf-rearing grounds altogether, residing nearby human development for safety (Hebblewhite et al. 2005). Other herds have formed large groups to balance predation risk with forage quality (Proffitt et al. 2009), as well as vigilance behavior and energy expenditure (Laundré et al. 2001). Wolf-induced fear exhibited by prey populations has been hypothesized to influence pregnancy rates, recruitment, and population productivity as a result of stress (Creel et al. 2007, Creel et al. 2009, Hamlin et al. 2009, Creel et al. 2011, White et al. 2011). However, empirical data found no evidence of a population-level trade-off between forage quality and wolf risk for mule deer or elk in Montana (i.e., no avoidance of wolves and selection of poorer quality habitat; Paterson et al. 2022a), nor predation risk-related resource selection that resulted in biologically meaningful changes in body fat or pregnancy rates (Paterson et al. 2022b). Although debated, reduced prey abundance and changes in behavior of prey populations as a result of wolf presence and density may impact habitats and the greater landscapes within YNP (Ripple et al. 2001, Fortin et al. 2005, Vucetich 2021), such as by benefiting the understory of forest stands, minimizing soil erosion, and alleviating pressure off riparian areas (Brown et al. 1999, Smith et al. 2003, Beschta and Ripple 2006, Bump et al. 2009, Painter et al. 2015). Other studies have found no elk response to wolf predation risk (Mech et al. 2001, Creel and Winnie Jr. 2005), that the magnitude of the effect was not biologically meaningful (Kauffman et al., 2010, Schmidt & Kuijper, 2015, Paterson et al. 2022b), or that the effect was highly variable in space and time (Creel et al. 2005, Creel et al. 2008, Gaynor et al. 2019, Cusack et al. 2020). Population size and density of wolf prey (elk and other cervids) outside of National Parks is intensely debated and managed based on competing human desires, further complicating the process of isolating and quantifying the impacts of wolf predation versus human influence on prey density and distribution in such areas.

Suitable climate and primary productivity (i.e., habitat quality and quantity) are vital for healthy and sustainable prey populations, regardless of the influence of predators. Reductions in prey populations are due to a combination of factors, such as harsh environmental conditions, reduced forage, and harvest, some or all of which may act in concert with predation (Cupples 2013). Habitat conservation, restoration, and management are mechanisms to increase ungulate forage biomass and quality, which ultimately can have bottom-up positive impacts on prey populations.

## **1.2.2 HISTORY**

The wolf was extirpated from the western United States during the 1900s, primarily due to loss of habitat, conflicts with people, and widespread persecution. Although wolf packs were eliminated from Montana by the 1930s, tracks, scat, and or observations of large wolf-like canids were reported or killed up until the 1970s. Most are thought to have been dispersers from Canada and little to no successful breeding activity was identified or sustained consistently through time. The USFWS listed all wolf populations, including those in the NRM, as endangered under the Endangered Species Act (hereafter, ESA) in 1973.

Wolf recovery in Montana began in the early 1980s via natural immigration from Canada. In 1995 and 1996 wolves were reintroduced into central Idaho and Yellowstone National Park by the USFWS. Wolves were not released within Montana, but wolf populations in YNP and central Idaho grew rapidly and soon became a source of dispersers to Montana via natural emigration. New packs formed outside the earliest core wolf areas and overall wolf distribution expanded. Wolf dispersal has been documented between and among population in the Northern Rocky Mountains (hereafter, NRM) including those in Montana, Idaho and Wyoming. From 1974–2011 (with a gap in 2009 when wolves were first briefly delisted), the USFWS has managed wolves in the US, under the authority of the ESA, as either “endangered” or “experimental, nonessential.” The federal wolf recovery goal of 30 breeding pairs for 3 consecutive years in the NRM of Montana, Idaho and Wyoming (i.e., 10 breeding pairs and 100 individuals in each recovery area: NW Montana, central Idaho, and Greater Yellowstone) and all other necessary criteria for delisting were met by 2002.

In anticipation of the delisting of wolves and potential management under state authority, Gov. Marc Racicot convened a 12-member Wolf Management Advisory Council (hereafter, the advisory council) in 2000, consisting of livestock producers, hunters, educators, outfitters, conservationists, and other citizens. The advisory council identified 26 “Guiding Principles” that addressed public interest, public safety, maintaining wildlife populations, and protecting the livestock industry, and determined it was appropriate for FWP to develop a wolf program. In 2002, FWP released the Montana Wolf Conservation and Management Planning Document and pursued public scoping in full compliance with the legal requirements of MEPA. This public process involved the mailing of 1,000 postcards and 12 community work sessions across the state, and receipt of 6,700 written or electronic comments. The advisory council and the commission reviewed a summary of public comments, from which FWP drafted the 2003 Wolf Plan and EIS. As a requirement of delisting under the ESA, the state of Montana, along with Idaho and Wyoming, were required to develop state management plans. The goal of each management plan was to ensure that regulatory mechanisms were in place to ensure each state would maintain a recovered population of wolves. The EIS, prepared for the 2003 Wolf Plan, analyzed five alternatives that represented the public’s values, opinions, and beliefs.

After another extensive public comment period of 60 days, involving 14 community work sessions and receipt of 5,500 written and electronic comments, Alternative 2 – Updated Council was selected to guide FWP’s conservation and management efforts to maintain a recovered population and integrate wolves into Montana’s wildlife management programs upon federal delisting. This preferred alternative described a spectrum of management activities that maintain viable populations of wolves and their prey, resolve wolf-livestock conflicts, and assure human safety, as well as mirrored public comments calling on FWP to seek common ground between wolf advocates and those most directly affected by wolf presence. Further, Alternative 2 – Updated Council described a wolf program based on principles of adaptive management that was consistent with modern wildlife management practices similar to those of other managed wildlife species, and strategies implemented would be driven by the status of the wolf population and incorporate public outreach, conservation education, law enforcement, and landowner relations. Importantly, regulated wolf harvest “would take place within the larger context of multi-species management programs, would be biologically sustainable, would not compromise the investments made to recover the wolf population... and should advance overall conservation goals by building social tolerance, interest in, and value for the species among those who would otherwise view wolf recovery as detrimental to their ungulate hunting experiences.”

The USFWS approved Montana’s 2003 Wolf Plan but delayed federal delisting due to concerns with Wyoming’s management plan. Anticipating this delay, FWP developed a contingency alternative to

provide Montana with more direct involvement in day-to-day monitoring and management of wolves (excluding harvest) while the species remained federally listed and under ultimate authority of the USFWS. With an amended record of decision in 2004, the contingency alternative was implemented. By the end of 2004, there was an estimated 835 wolves and 66 breeding pairs in the NRM. In Montana, there were about 153 wolves in 15 breeding pairs at that time. From the time recovery goals were met to delisting, the wolf population in the NRM tripled. The NRM population segment of wolves was first delisted in 2009 (USFWS 2009). The delisting rule claimed that the carrying capacity of the NRM wolf population was likely around 1,500 wolves, and wolves “will be managed by the states, National Park Service, and Service to average over 1,100 wolves, fluctuating around 400 wolves in Montana, 500 in Idaho, and 200 to 300 in Wyoming...maintaining the NRM gray wolf population at or above 1,500 wolves in currently occupied areas would slowly reduce wild prey abundance in suitable wolf habitat. This would result in a gradual decline in the number of wolves that could be supported in suitable habitat. Higher rates of livestock depredation in these and surrounding areas would follow. This too would reduce the wolf population because problem wolves are typically controlled.” The 2009 final delisting rule published in the federal register set a benchmark of a minimum of 150 wolves and 15 breeding pairs for Montana to ensure the population never falls below recovery goals (USFWS 2009).

After being relisted on the ESA in 2010 because Wyoming lacked an approved state plan and laws, the NRM population segment of wolves in Montana and Idaho was congressionally delisted in May 2011. Wolves in Montana have been managed under state authority as a “species in need of management” since that time (annual reporting to the USFWS was required as part of the post-delisting monitoring plan from 2011–2016). Therefore, wolf management in Montana has been guided by Alternative 1, No Action in the EIS, which constitutes the 2003 Wolf Plan. The minimum population benchmark in the 2003 Wolf Plan and associated EIS reflected that of the federal register. The 2003 Wolf Plan also established an incremental approach to wolf management that allows managers latitude to adjust wolf numbers and distribution and allows for a regulated harvest of wolves as a wildlife management tool. Implementation of the 2003 Wolf Plan has been ongoing since delisting and, using a combination of license dollars and federal Pittman-Robertson funds (excise tax on firearms, ammunition, and hunting and trapping equipment), FWP has monitored the wolf population (i.e., distribution and abundance), mitigated conflict including livestock depredation and other wolf control, coordinated and authorized research, conducted public outreach, and developed and used contemporary population estimation tools. FWP has managed harvest consistent with state law and Commission regulation (i.e., hunting and trapping seasons) since wolves were delisted from the ESA. Montana maintained an estimated population of 1,087 to 1,260 wolves from 2011–2022, with a harvest of 166 to 327 wolves annually without demonstrable negative effect on population viability.

### **1.2.3 CURRENT POPULATION STATUS AND DISTRIBUTIONS**

From the early 2000s to the time wolves were delisted, a steady increase and expansion of wolf population size and distribution was observed. Once Montana assumed full management authority for wolves, annual hunting was implemented immediately (in 2009 and then again in 2011) and trapping was implemented beginning in 2012. Subsequently, wolf population growth stabilized and expansion of occupied areas slowed. Additionally, territory sizes decreased over time, potentially leading to more packs in the same total occupied area. Population numbers have remained considerably above the federal recovery minimum threshold of 15 breeding pairs and 150 wolves in Montana since 2011. From 2011–2022, the population appears to have become somewhat stabilized with an average of 194 packs and 1,165 wolves per year (Figures 1-4; 191 packs and 1,138 wolves per year, 2016–2022). Since

delisting and transition to state management, harvest increased and depredation removals decreased, but in more recent years have remained stable. Region 1 holds about 41% of the state’s wolf population which has declined slightly and stabilized at around 73 packs and 460 wolves. Region 2 holds about 26% of the population which has declined slightly and stabilized at around 44 packs and 286 wolves. Similarly, Region 3, which holds about 20% of the population, has declined slightly over time and stabilized at around 36 packs and 219 wolves. At present, the area occupied by wolves is about 67,879 km<sup>2</sup> (39,126–77,958 km<sup>2</sup> from 2007–2022), mean territory size is about 450 km<sup>2</sup>, and mean pack size is about 5.4 individuals (and estimated to be similar across Montana). Annual population and harvest metrics can be found in the annual reports produced by the Montana Gray Wolf Program ([fwp.mt.gov/conservation/wildlife-management/wolf](http://fwp.mt.gov/conservation/wildlife-management/wolf)).

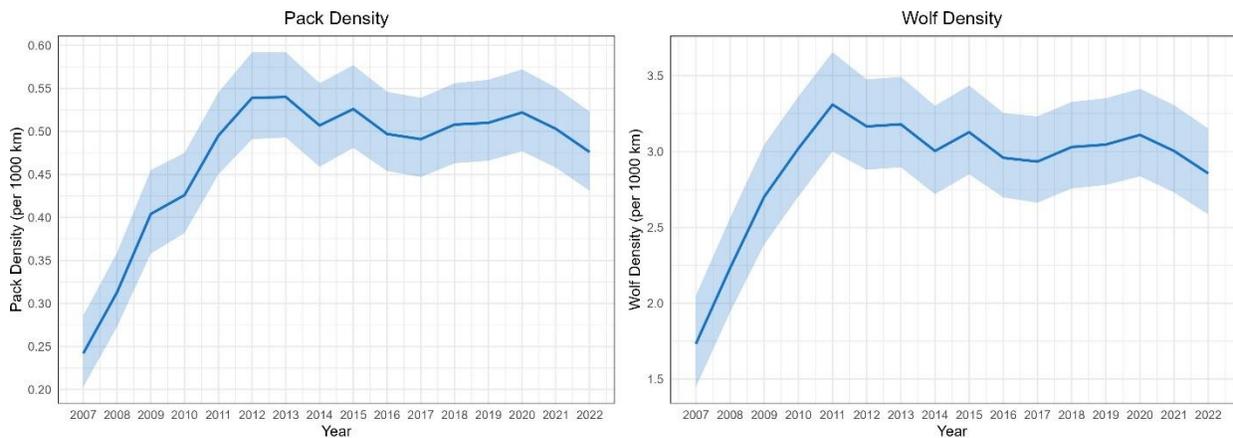


Figure 1. Statewide pack and wolf density (per 1000 km) by calendar year following the population estimate, from 2007–2022 (Parks et al. 2023).

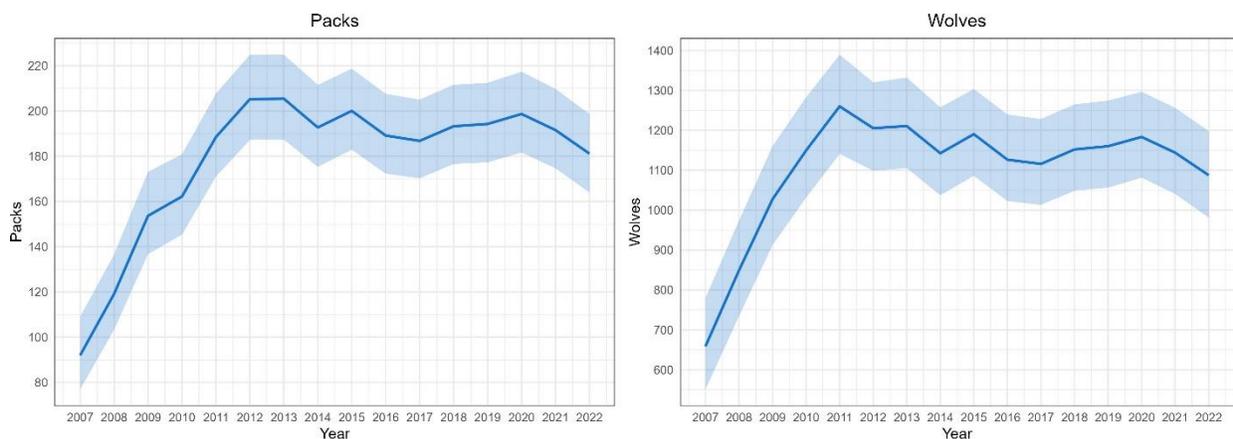


Figure 2. Number of packs and wolves in Montana by calendar year following the population estimate, from 2007–2022 (Parks et al. 2023).

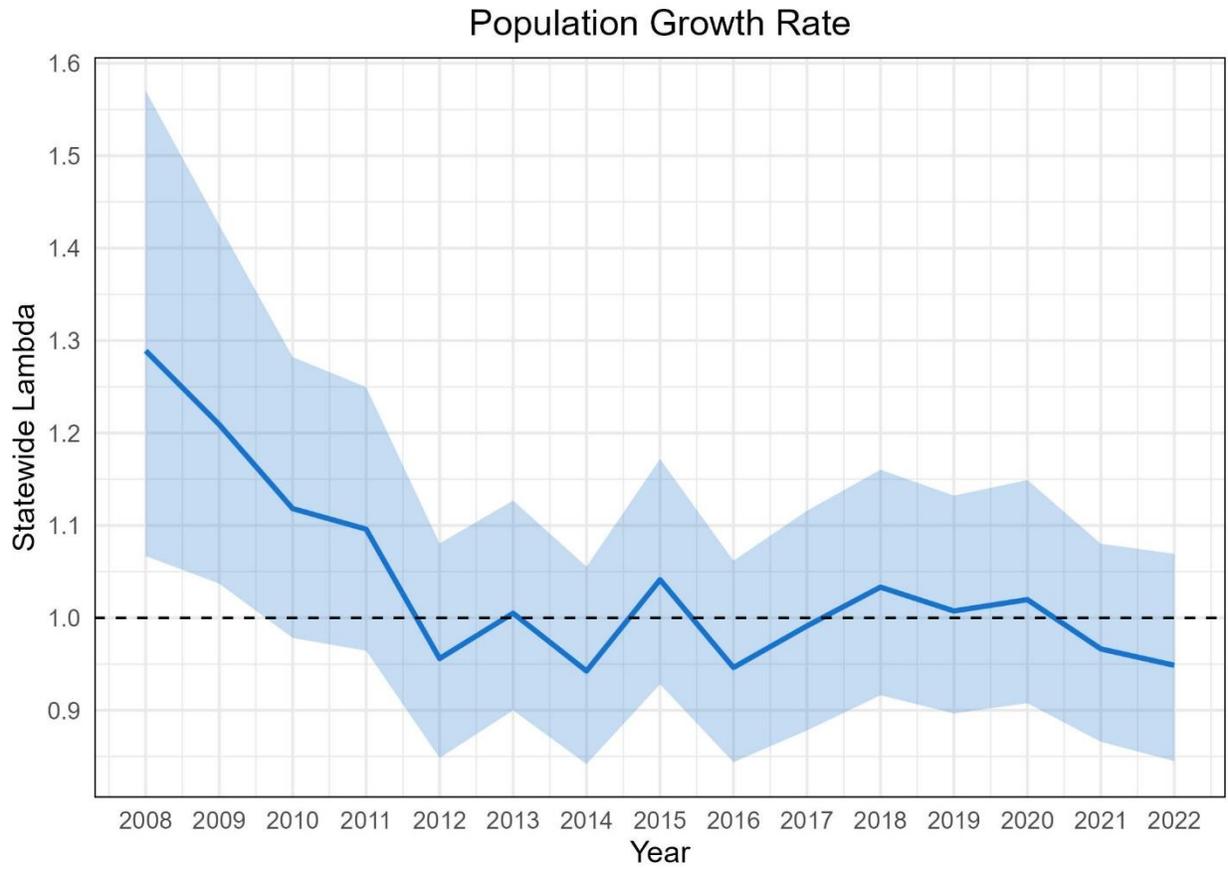


Figure 3. Population growth rate (lambda) in Montana by calendar year following the population estimate, from 2008–2022 (Parks et al. 2023).

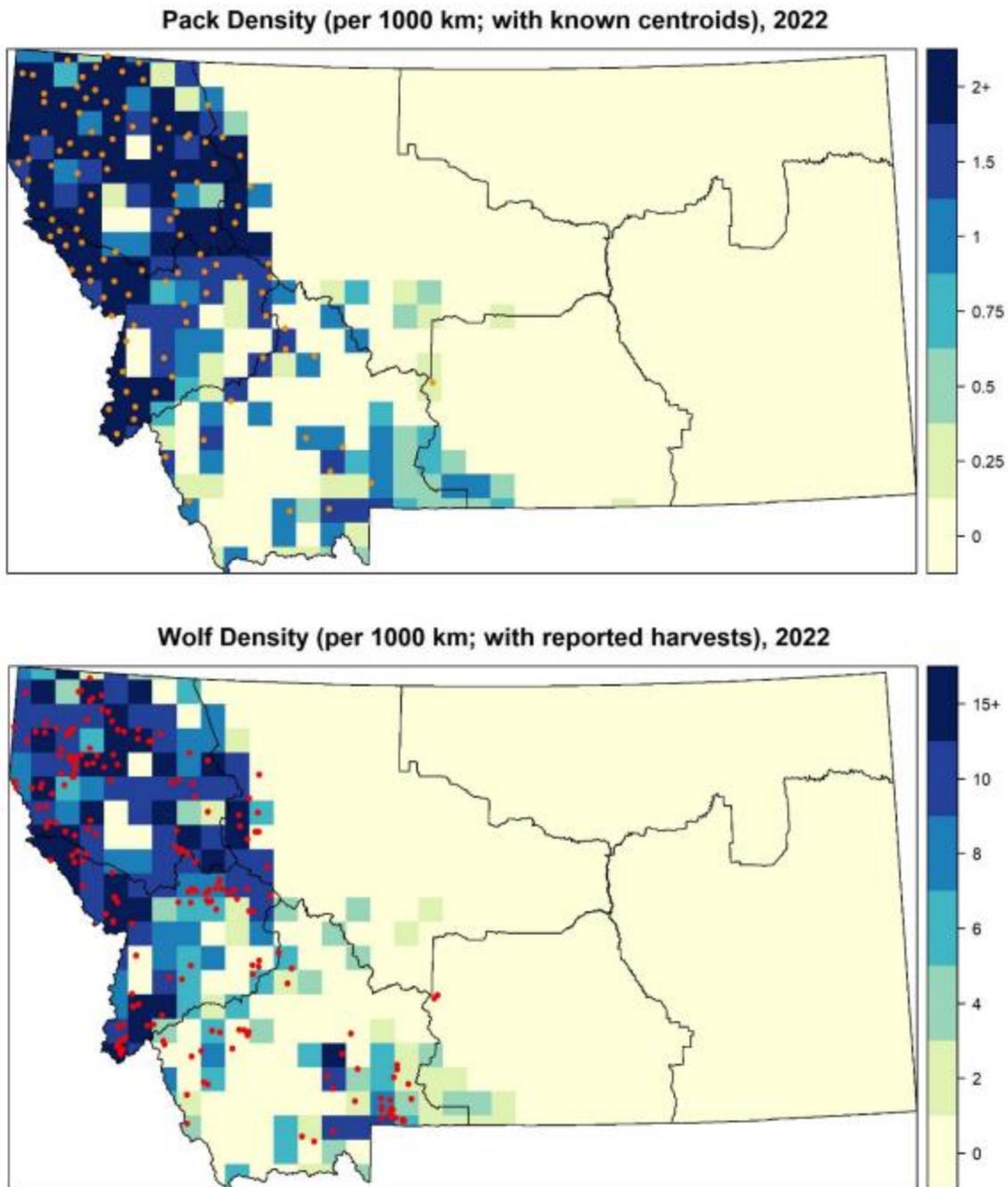


Figure 4. Estimated pack and wolf densities in Montana, 2022, per 1,000 km<sup>2</sup>. Orange points demarcate territory centroids identified through monitoring in 2022 (pack density map), whereas red points demarcate reported harvest locations in 2022 (wolf density map; Parks et al. 2023).

Because wolves are currently under state authority, state laws are the primary regulatory and legal mechanisms guiding management. Two Titles within Montana statutes describe the legal status and

management framework for wolves. Title 87 pertains to fish and wildlife species and oversight by FWP. Title 81 pertains to the Montana Department of Livestock (MDOL) and their responsibilities related to predator control. In 2001, the Montana Legislature passed SB163, which amended several statutes in both Titles. Governor Martz signed SB163 on April 21, 2001. Through passage of SB163, provisions in § 81-7-101 to § 81-7-104, Montana Code Annotated (MCA), automatically removed wolves from the state endangered species list, concurrent with federal action concluding that wolves are no longer endangered. This action removed their designation as “predatory in nature,” thereby assuring that wolf-livestock conflicts are addressed and resolved using management strategies described in the 2003 Wolf Plan.

Wolves are currently classified as a species “in need of management” (§ 87-5-131, MCA) and this designation may change if or when appropriate through legislative action, however classification has not been changed to “game animal” or “furbearer” because doing so would preclude nonresidents from trapping wolves and because game animals are not trapped (§ 87-2-101, MCA). Regardless of change in management direction due to change in classification (unless wolves are relisted under the ESA in which case the management tools available for implementation would be much more restrictive), FWP uses the same tools to adjust populations in accordance with the direction that those regulatory changes provide. “Management” is defined in MCA 87-5-102 as: “the collection and application of biological information for the purposes of increasing the number of individuals within species and populations of wildlife, up to the optimum carrying capacity of their habitat, and maintaining such levels. The term includes the entire range of activities that constitute a modern scientific resource program including but not limited to research, census, law enforcement, habitat improvement, and education. Also included within the term, when and where appropriate, is the periodic or total protection of species or populations as well as regulated taking.” FWP and the commission, with the involvement of public input, has established the regulatory framework to manage wolves.

## 1.3 PURPOSE AND NEED

MEPA and its implementing rules (ARM 12.2.428, *et. seq*) require that any DEIS prepared by a state agency include a description of the purpose and benefits of the proposed project, which are described in the sections below.

FWP’s purpose is to provide management guidance for wolves within the state of Montana under a new and adaptable, programmatic plan. The 2023 Wolf Plan assures ongoing, contemporaneous, sound science-based, and flexible management methodologies through incorporation of the following elements:

- New wolf-related research and associated science-based information
- New and available wolf management tools and methods employed by FWP
- Ensured continued public transparency related to wolf management practices in Montana
- Compliance with existing laws, regulations, and policies, as well as inter-governmental commitments made by FWP and the commission
- Recognition of the need for adaptable wolf management strategies to accommodate ever-changing wolf population dynamics influenced by:

- Changes in wolf density and distribution in response to varying human-caused mortality
- Environmental factors
- Human developments
- Prey availability
- Contextual changes in the sociopolitical climate

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolves are now well established on the Montana landscape and FWP remains committed to maintaining the long-term viability of wolves, consistent with a long history of wildlife conservation in the state. The challenge is balancing conflicting human values and addressing the diverse needs of wolves and humans. The proposed 2023 Wolf Plan provides the foundation for contemporary and future FWP recommendations to the commission for decisions regarding conservation and management of wolves that is flexible in addressing varying considerations, both biological and sociopolitical, at the state level.

### **1.3.1 BENEFITS**

The project would provide the following federal, state, local, and resource benefits:

#### **Federal Benefits**

Under the preferred alternative, the statewide management plan provides clear direction on how wolves are adaptively managed by the state. FWP implements flexible management strategies to ensure population sustainability and longevity as ecological and sociopolitical environments change, to accommodate changes in law and political leadership, and to incorporate new and available science into practical and applied management strategies. These commitments provide assurance to the USFWS, as well as federal land managers, that management will continue for this species, and that adequate regulatory mechanisms are in place to ensure long term population sustainability and viability – one of

the five criteria used to evaluate whether protections under the ESA and a return to federal management of the species are warranted. The other ESA listing criteria (sufficient suitable habitat, no over-utilization of the species, disease is not a limiting factor for population longevity, and no other man-made or natural factors that could impact its existence) are described in the preferred alternative and ensured through the monitoring and management of the population and its trends.

### **State Benefits**

Adoption of the preferred alternative would provide the citizens and residents of Montana with a clear understanding of how wolves are managed by the state. Managing wolves as a resident native species according to state guidelines would allow the program to meet the goal of conserving and managing wolves while adapting to the needs and interests of all of Montana's citizens, residents, and visitors alike, regardless of their values related to wolves.

### **Local Benefits**

Similar to state and federal benefits, the primary benefit of the preferred alternative is continued public transparency in how wolves are monitored and managed in the state and providing FWP with adaptability and flexibility. The preferred alternative would allow for implementation of varying wolf management strategies that address different local population objectives. For example, an area with ungulate population concerns may benefit from liberal wolf harvest regulations while an area that values ecotourism may benefit from conservative wolf harvest strategies. As a result, local benefits may differ across the state.

### **Resource Benefits**

Adoption of the preferred alternative would ensure wolf population presence, sustainability, viability, and longevity. Wolf population monitoring and management can be executed effectively and efficiently to maintain a viable wolf population in the state of Montana, avoid the need for future ESA re-listing, and thereby maintain state oversight of wolf management practices.

## **1.4 AGENCY AUTHORITY AND ACTIONS**

The major decisions to be made by FWP are described below. No other permits, certificates, licenses, or approvals would be required before implementation of the proposed action could begin.

### **Applicable Legal Statutes, Classifications, and Regulations**

FWP has the authority under law (§ 87-1-201, MCA) to protect, enhance and regulate the use of Montana's fish and wildlife resources for public benefit now and in the future. The 2003 Wolf Plan was approved by the USFWS in 2004. Nine years after having been declared recovered, and with a minimum wolf population of more than 1,600 wolves and 100 breeding pairs in the NRM, in April 2011, a congressional budget bill directed the federal Secretary of the Interior to reissue the final ESA-delisting rule for NRM wolves. On May 5, 2011, the USFWS published the final delisting rule designating wolves throughout the Distinct Population Segment (DPS), except Wyoming, as a delisted species. The wolf was then reclassified as a Species in Need of Management in Montana. Montana's laws, administrative rules,

and state plan replaced the federal framework. Current statutes, classifications and regulations can be found on [fwp.mt.gov](http://fwp.mt.gov) (also see list of statutes, rules, and other applicable regulations below).

## 1.4.1 MONTANA STATUTES AND ADMINISTRATIVE RULES

### Montana Code Annotated – Title 87, Fish and Wildlife; Title 2, Government Structure and Administration; Title 81, Livestock

§ 87-1-201, MCA	Powers and duties of the Department
§ 87-1-214, MCA	Disclosure of information -- legislative finding -- large predators
§ 87-1-217, MCA	Policy for management of large predators
§ 87-1-301, MCA	Powers of the Montana Fish and Wildlife Commission
§ 87-1-303, MCA	Rules for use of lands and waters
§ 87-1-304, MCA	Fixing of seasons and bag and possession limits
§ 87-1-901, MCA	Gray wolf management – rulemaking – reporting
§ 87-1-601, MCA	Use of fish and game money
§ 87-1-623, MCA	Wolf management account
§ 87-1-625, MCA	Funding for wolf management
§ 87-1-708, MCA	Assent to Pittman-Robertson Act
§ 87-2-101, MCA	Definitions
§ 87-2-813, MCA	Auction or lottery wolf license
§ 87-2-104, MCA	Number of licenses, permits, or tags allowed – fees
§ 87-2-523, MCA	Class E-1 – Resident Wolf License
§ 87-2-524, MCA	Class E-2 – Nonresident Wolf License
§ 87-5-131, MCA	Process for delisting of gray wolf
§ 87-5-132, MCA	Use of radio-tracking collars for monitoring wolf packs
§ 87-5-725, MCA	Notification of translocation or introduction of wildlife
§ 87-6-106, MCA	Lawful taking to protect livestock or person
§ 87-6-202, MCA	Unlawful possession, shipping, or transportation of game fish, bird, game animal, or fur-bearing animal
§ 87-6-205, MCA	Waste of game animal, game bird, or game fish
§ 87-6-206, MCA	Unlawful sale of game fish, bird, game animal, or fur-bearing animal
§ 87-6-207, MCA	Unlawful use of a boat
§ 87-6-214, MCA	Unlawful contest or prize
§ 87-6-401, MCA	Unlawful use of equipment while hunting
§ 87-6-413, MCA	Hunting or killing over limit
§ 87-6-906, MCA	Restitution for illegal killing, possession, or waste of certain wildlife
§ 2-15-3110, MCA	Livestock loss board – purpose, membership, and qualifications
§ 2-15-3111, MCA	Livestock loss reduction program
§ 2-15-3112, MCA	Livestock loss mitigation program – definitions
§ 2-15-3113, MCA	Additional powers and duties of livestock loss board
§ 81-1-110, MCA	Livestock loss reduction and mitigation accounts

§ 81-1-111, MCA	Livestock loss reduction and mitigation trust fund
§ 81-7-123, MCA	Voluntary wolf mitigation account

### Administrative Rules of Montana – Title 12 Fish, Wildlife and Parks

ARM 12.9.1301	Commitment to Preservation of the Gray Wolf as Resident Wildlife in Need of Management
ARM 12.9.1302	Definitions
ARM 12.9.1303	Control Methods of the Gray Wolf Include Nonlethal and Lethal Means
ARM 12.9.1304	Allowable Nonlethal Control of the Gray Wolf
ARM 12.9.1305	Allowable Lethal Control of the Gray Wolf

### Montana Administrative Rules – Title 36 Department of Natural Resources

ARM 36.11.430	Threatened and Endangered Species – Gray Wolf (REPEALED)
---------------	--

### FWP Regulatory Decisions

The Montana Environmental Policy Act (MEPA) requires a state agency to conduct an environmental review when making decisions or planning activities that may have a significant impact on the human environment. FWP concluded the decision to approve or deny the statewide management plan would be a major *state action* requiring preparation of a DEIS. MEPA (Title 75, chapter 1, parts 1 through 3, MCA) and its implementing administrative rules (ARM 12.2.428, *et seq.*).

### MEPA Review Process

FWP Implements MEPA according to the requirements contained in Title 75, chapter 1, parts 1 through 3, MCA) and its implementing administrative rules (ARM 12.2.429, *et seq.*).

FWP must first determine whether a proposed state action is subject to MEPA review and, if so, the level of environmental review required. According to ARM 12.2.429(1), a state “action” subject to MEPA review is “a project, program or activity directly undertaken by the agency; a project or activity supported through a contract, grant, subsidy, loan or other form of funding assistance from the agency, either singly or in combination with one or more other state agencies; or a project or activity involving the issuance of a lease, permit, license, certificate, or other entitlement for use or permission to act by the agency, either singly or in combination with other state agencies.” All state actions are subject to MEPA review except those that qualify for a categorical exclusion under ARM 12.2.454, *Actions that Qualify for A Categorical Exclusion*, or those justified by a prior programmatic review conducted according to the requirements of ARM 12.2.444, *Preparation, Content, and Distribution of Programmatic Review*.

There are two levels of environmental review outlined by MEPA, environmental assessments (EA) and environmental impact statements (EIS). The only substantive differences between an EA and an EIS lie in the scope and depth of analysis. There also are substantial procedural differences between an EA and an

EIS. For example, an EIS requires more formal procedures for public review and agency response to public comment. Although an EIS is more complex than an EA, the substantive requirements for both types of analysis are similar. A standard topical outline for a generic environmental review document (EA or EIS) would include the following elements: a description of the purpose and need for the proposed action; a description of the affected environment; a description and analysis of the alternatives, including the “no action” alternative; and an analysis of the impacts to the physical and human environment of the different alternatives, including an evaluation of appropriate mitigation measures.

FWP concluded the decision to approve or deny the 2023 Wolf Plan would be a major *state action*; therefore, according to the requirements of ARM 12.2.430(1)(b), the proposed action requires FWP to prepare EIS-level review or DEIS for the proposed action.

### **Conditions**

FWP determined that a DEIS was needed before making its decision. Therefore, following adequate notice and opportunity for public and affected agency input on the DEIS. FWP must consider any substantive comments, and/or any new and relevant information received in response to the DEIS, and proceed with one of the following actions:

- Adopt the DEIS as final, according to the applicable requirements of *ARM 12.2.437, Adoption of Draft Environmental Impact Statement as Final*,
- Develop and issue the FEIS according to the applicable requirements of *ARM 12.2.438, Preparation and Contents of Final Environmental Impact Statements*, or
- Determine substantial changes to the DEIS are necessary and develop and issue a Supplemental Environmental Impact Statement or SEIS according to the applicable requirements of *ARM 12.2.440, Supplements to Environmental Impact Statements*.

The contents and direction of the proposed statewide plan and DEIS are compliant with applicable state and federal laws and rules.

### **Conditions for Denial**

FWP may not approve the project if there are unacceptable impacts on the human environment. The statewide plan would be denied if it were found to violate state or federal laws or rules, or if it had unacceptable impacts to key issues. However, there are no unacceptable impacts associated with the proposed project as the 2023 Wolf Plan is non-regulatory and primarily provides management guidance for the agency and increases public awareness related to wolf management strategies employed in Montana.

## **1.5 PUBLIC OUTREACH**

### **1.5.1 SCOPING**

Scoping provides an opportunity for public and agency involvement during the early planning stages of the EIS analysis. The intent of the scoping process is to gather comments, concerns, and ideas from

those who have an interest in or who may be affected by the *proposed action*. These internal and public processes serve to fulfill the scoping requirements of MEPA.

According to the requirements of ARM 12.2.436(4)(a), an EIS must include an evaluation of the direct, secondary, and cumulative impacts on the physical environment including, where appropriate: terrestrial and aquatic life and habitats; water quality, quantity, and distribution; geology, soil quality, stability, and moisture; vegetation cover, quantity and quality; aesthetics; air quality; unique, endangered, fragile, or limited environmental resources; historical and archaeological sites; and demands on environmental resources of land, water, air and energy.

An EIS must also evaluate direct, secondary, and cumulative impacts on the human population in the area affected by the proposed action including, where appropriate, social structures and mores; cultural uniqueness and diversity; access to and quality of recreational and wilderness activities; local and state tax base and tax revenues; agricultural or industrial production; human health; quantity and distribution of employment; distribution and density of population and housing; demands for government services; industrial and commercial activity; locally adopted environmental plans and goals; and other appropriate social and economic circumstances.

Several strategies were used to inform the public about and solicit comments on the *proposed action*. FWP requested input from the public on the direct, secondary, and cumulative impacts on the physical environment and the human population. The 30-day public scoping period began with the publication of the Scoping Notice on Wednesday, March 22, 2023, and continued through Saturday, April 22, 2023. FWP considered all applicable input provided during the virtual public scoping meetings (Tuesdays, April 4 and 11, 2023, 6-8 p.m. MST) as well as all applicable input received (via email or through the FWP website) or postmarked by Saturday, April 22, 2023, in defining the scope of the DEIS.

## 1.5.2 SCOPING ISSUE IDENTIFICATION

During scoping, FWP staff identified several strategic and fundamental objectives that highlight potential issues or concerns like those heard through numerous public venues. FWP considered all issues and concerns in the preparation of this DEIS. The following section describes those scoping issues the DEIS interdisciplinary team identified as *key issues* considered during alternatives development. All key issues are further evaluated in **Chapter 3** of the DEIS.

- Wolf population viability over the long term.
- Using sound science to monitor and manage wolf populations , balancing best available methodologies with what is most practical with implementable strategies.
- Ensure flexibility to accommodate changes in law, political leadership, and overall management strategy.
- Intergovernmental, interagency, and tribal coordination.
- Engagement and inclusion among people with diverse and competing values, specifically the intentional presence of the non-consumptive user group in decision making/planning processes.
- Transparency of wolf management planning processes.
- Establishment of an all-inclusive and new Wolf Advisory Council with equal representation of stakeholder groups to inform plan development.

- Clarity of state-wide wolf management objectives, how regulations relate and aim to address those objectives, and how prey-species population objectives relate to wolf management objectives.
- Consideration that management objectives should not simply be aimed at the bare-minimum number of wolves or breeding pairs within the existing population.
- Effective wolf-related education and outreach focused on the ecology of wolves and the role they play in their ecosystem.
- Summarization of wolf population and management impacts on ecotourism and economic benefits of local communities and businesses.
- Transparency of the iPOM model, how it works, and why FWP uses it to accurately estimate population metrics.
- Consideration of alternative population survey methods (e.g., minimum counts).
- More frequent public updates on wolf population and management.
- Consideration of non-lethal management strategies for conflict prevention and more conservative harvest regulations (e.g., buffer zones around YNP).
- Public understanding of the role of hunting/trapping and conflict prevention at appropriate locations, levels, and times.
- Emphasis on habitat improvement, conservation, and management.
- Maintain genetic connectivity.
- Reimplementation of the wolf stamp program to fund non-lethal conflict resolution.
- Public safety of recreators (i.e., their pets), and of people (i.e., wildlife-vehicle collisions).
- Manage wolves by ecoregions and/or geography, not by WMUs, and create a permit (i.e., lottery) system for wolf harvest.
- Establish hunting/trapping regulations that minimize interference with grizzly bear recovery.
- Analysis of a trophic-cascade alternative where wolves would be reclassified as non-game wildlife or species of wildlife concern, harvest of wolves would be eliminated, and a management plan would solely focus on conservation.
- Analysis of a no-management alternative where wolves would be reclassified as predators, not managed or regulated by the state, and can be harvested, hunted, or trapped at any time without any quotas, thresholds, or bag limits.

### **1.5.3 KEY ISSUES IDENTIFIED DURING PUBLIC SCOPING FOR DETAILED ANALYSIS**

The issue statements below are intended to capture the essence of public and agency concerns related to wolf management in Montana, as it relates to the alternatives analyzed herein. These issues are further analyzed in **Chapter 2**, Description of Alternatives and detailed resource impacts analyses of these issues are provided in **Chapter 3** (direct, secondary, and cumulative impacts).

#### **Issues considered within alternatives**

FWP has identified broad themes in wolf management where FWP recommendations, management, and input will have substantial effects on the species status, and on the lives of Montanans. These themes are listed here and provide organizational structure for the agency's decision making. These

issues have emerged from years of inter-agency collaboration on wolf conservation, previous state and inter-agency plans, routine interactions with the public and associated public input.

### ***Issue 1: Inclusion***

As managers of the public trust (i.e., public trust doctrine [Batcheller et al. 2010]), selected and appointed officials have an obligation to listen to the trustees and beneficiaries of the trust (i.e., the people of Montana). States have almost sole authority over wildlife management, except for federally protected species (e.g., migratory birds or ESA listings), reserved federal lands (e.g., National Parks), or Native American treaty rights. Because of the unique relationships between federal and state governments, tribes, the public, and wolves, effective management that ensures wolf population viability and longevity in the NRM requires collaboration between all stakeholders. Further, FWP is dedicated to interagency coordination and the sharing of biological data between responsible agencies to maintain wolf population sustainability and presence on the landscape. Important issues include the population status and trend within each state, the disposition of cross-boundary packs, and whether there are foreseeable problems with achieving certain goals and objectives into the future. Information on wolf population status and trends as well as wolf population monitoring and management help with improvement of techniques and protocols. Collaborative research projects at regional scales may also be developed, coordinated, and implemented. Periodic administrative coordination may be required. Collectively, this will facilitate a problem-solving atmosphere for issues shared by all parties.

FWP collaborates and partners with federal agencies on wolf management and mitigation of wolf-livestock conflicts, as well as with other agencies, universities, and Tribal Nations to conduct biological and social research and monitoring. Eight Tribal affiliations were notified of and invited to consult on this plan and associated EIS: Blackfoot Tribe of the Blackfoot Indian Reservation of Montana, Confederated Salish and Kootenai Tribes of the Flathead Reservation, Chippewa Cree Tribe of Rocky Boy's Reservation, Fort Peck Assiniboine and Sioux Tribes of Fort Peck Indian Reservation, Crow Tribe of Crow Indian Reservation, Little Shell Tribe of Chippewa Indians of Montana, and Northern Cheyenne Tribe and Indian Reservation. Additional emails were sent to alert the Tribes and follow-up calls were made later in the comment period. To date, no concerns were communicated by any Tribe. Further consultation with the Tribes will be pursued in accordance with Section 106 of the NHPA (54 USC § 306108) and its implementing regulations (36 CFR Part 800).

The 2023 Wolf Plan attempts to balance a broad scope and wide breadth of public values and perspectives. To identify and address the wide range of benefits, challenges, and public concerns associated with wolves and wolf management, the 2023 Wolf Plan summarizes surveys and questionnaires on publicly held values toward wolves, describes impacts of wolf population and management on ecotourism and the livestock industry, highlights ongoing research, and suggests development of effective wolf-related education and outreach. Ultimately, FWP strives for public understanding on the role of wolf management and the various strategies (lethal and non-lethal) implemented at appropriate locations, levels, and times.

### ***Issue 2: Public Transparency***

FWP and Montanans want increased public transparency. The 2023 Wolf Plan describes the development of that plan and associated DEIS, wolf management regulations and decisions, and estimation of various population metrics. This includes clarity of state-wide wolf management objectives and how regulations relate and aim to address those objectives. FWP also aims to provide more detailed

information on how to access educational materials to increase understanding of these various processes, as well as provide more awareness of opportunities to participate and engage in the wolf management process.

See **Chapter 2, Section 2.4.1** for more detailed information on the **education and outreach program**.

### ***Issue 3: Population management***

FWP implements flexible management strategies to ensure population sustainability and longevity as ecological and sociopolitical environments change, to accommodate changes in law and political leadership, and to incorporate new and available science into practical and applied management strategies. Adaptive management refers to the formal structured decision-making process but is a term often used when meaning flexible management. Management decisions are based on the current and predicted future status of resources (e.g., FWP staffing, funding), considering uncertainty, objectives, and constraints. Research and management monitoring of wolf density and distribution are conducted to evaluate outcomes of previous decisions. Management actions change through time based on current wolf population status and trends compared with management objectives. As a result, FWP evaluates and periodically changes how wolves are monitored and managed. Further, FWP incorporates new wolf-related science and information as it becomes available and modifies its management approach as appropriate and practical. What is consistent in the wolf program, however, are the following objectives that guide implementation. These management objectives were originally developed to inform the commission's setting of the 2010 wolf hunting season, before wolves were relisted that year, as described in Runge et al. (2013). Since that time, these objectives have been incorporated into most wolf season proposals drafted by FWP. The originally written third objective was changed from listing "livestock producers, hunters, and other stakeholders" to "all stakeholders" to be inclusive of the diversity of values pertaining to wolves. These management objectives include, but are not limited to:

1. Maintain a viable and connected wolf population in Montana.
2. Maintain authority for State of Montana to manage wolves.
3. Maintain positive and effective working relationships with all stakeholders.
4. Reduce wolf impacts on
  - a. livestock, and
  - b. big game populations.
5. Maintain sustainable hunter opportunity for wolves.
6. Maintain sustainable hunter opportunity for ungulates.
7. Increase broad public acceptance of sustainable harvest and hunter opportunity as part of wolf conservation.
8. Enhance open and effective communication to better inform decisions.
9. Learn and improve as we go.

See **Chapter 2, Section 2.4.1** for more detailed information on **population management**.

## 1.5.4 SCOPING ISSUES ELIMINATED FROM DETAILED ANALYSIS

This section identifies and summarizes issues brought forward by the public that were eliminated from detailed analysis. These issues were not further analyzed because they are covered by existing laws and regulations, are not practical, or have been deemed unreasonable under the proposed action.

### **Wolf Plan Advisory Council**

A Wolf Advisory Council would be developed to assist FWP in the development of the 2023 Wolf Plan and be all-inclusive of broad public values and beliefs. While FWP recognizes the benefit of a council and have in fact utilized them in the past for wolves and other species, it is not necessary given that wolves have been managed successfully by FWP since their delisting. Further, historic public process related to wolf management in Montana is robust, starting with the 2003 Wolf Plan Advisory Council and consisting of several opportunities for continuous and iterative input into specific decisions about wolf harvest throughout the public season-setting process. Wolf seasons are currently reviewed annually due to public interest and its controversial nature, and while unlikely and not anticipated, this frequency may change. Opportunity for public comment is, has been, and will always be available and welcomed by the agency. With consideration for the robust public process conducted, to date, and to be time efficient and productive, FWP will proceed in the development of the 2023 Wolf Plan without a new Wolf Advisory Council. Specific to the proposed action, FWP believes there is ample opportunity for the affected public to provide comment through the public scoping and DEIS commentary processes. Additionally, based on decades of experience, FWP is confident in their thorough understanding of the diversity of opinions and perspectives surrounding wolf population and species management and recognizes that it would be extremely difficult to arrive at clear public consensus on such a polarized subject. At this point in time, FWP believes there would be little, if any, added benefit to a new Wolf Advisory Council to further inform the already robust public process associated with development of the 2023 Wolf Plan.

Thus, the establishment of a new Wolf Advisory Council to inform development of the 2023 Wolf Plan was dismissed from further consideration.

### **Trophic-Cascade Alternative**

In this alternative, there would be no numerical wolf population objective or cap and the wolf population would be allowed to find a natural carrying capacity, regulated only by ecological processes. This management plan would solely focus on wolf conservation, reclassify wolves as species of concern, and the harvest of wolves through hunting and trapping seasons would be eliminated. Lethal-management strategies would be eliminated from utilization, aside from provisions for wolf-livestock conflict mitigation, protection of property (§ 87-1-901, MCA), or an actively threatening wolf (§ 87-6-106, MCA). Removal or take of wolves outside of these sideboards would be considered illegal and poaching. FWP understands the wide breadth and diversity of values of Montanans (see **Chapter 3, Section 3.1.3**). Although this alternative would theoretically create the most certainty that wolves would thrive indefinitely in Montana, FWP considers this approach naïve, costly, and impractical.

FWP recognizes that wolves are involved in several interspecific interactions, many of which have top-down effects in the wildlife communities to which they belong. The relationships between carnivores and other species, and the ecosystems in which they live, is extremely complex and dependent on

ecological, environmental, and landscape factors (Estes 1996). Despite volumes of published literature on wolves, there is limited evidence of the precise nature, degree, and mechanisms by which wolves affect ecosystems via cascading effects across trophic levels (i.e., trophic-cascades; Silliman and Angelini 2012, Hale and Koprowski 2018). Density-dependent factors (Kauffman et al. 2010), weather and climate change (Despain 2005), and independent population dynamics of other species (Wolf et al. 2007, Bilyeu et al. 2008) also influence prey population fluctuations. See **Chapter 1, Section 1.2.1** for more information on interspecific interactions involving wolves. Private land management practices would further limit trophic-cascade effects between wolves and ungulate species. Variation in how landowners manage their property may attract, deter, or exclude other wildlife, regardless of the influence of wolves. Therefore, the impacts of wolves on prey species and subsequent indirect impacts on aspects in the surrounding ecosystem are confounded.

There are also politically-based issues that do not align with this alternative. First, Governor Gianforte determined there is a need for the 2023 Wolf Plan to flexibly manage wolves, based on a changing ecological and sociopolitical environment, for population sustainability and longevity. Further, to uphold its obligation to protect, enhance, and regulate the use of Montana's fish and wildlife resources for public benefit now and in the future (§ 87-1-201, MCA), it is imperative FWP maintains healthy populations of *all* species and habitats that may be directly or indirectly impacted by wolves. It is also the responsibility of FWP to provide harvest opportunities (i.e., hunting/trapping) of game species to the public, as part of Montana heritage (§ 87-1-217, MCA). In order to maintain a stable ecosystem, management of classified species is necessary, and thereby, a trophic-cascade alternative is impractical and unreasonable. Also, importantly, FWP is mandated by law to implement legislation regarding wolves that includes hunting and trapping as an element of wolf management (§ 87-1-901, MCA).

Thus, the trophic-cascade alternative was dismissed from further, detailed consideration and analysis.

### **A No-Management Alternative**

FWP might conceivably consider an alternative approach under which wolf presence would not be tolerated anywhere in Montana. This management strategy would focus on the elimination of wolves. In other words, there would be no need for state management authority to regulate take of wolves. A no-management alternative would not require the 2023 Wolf Plan to be developed and would not utilize the 2003 Wolf Plan. Wolves would be reclassified as predators or as non-game wildlife, meaning that harvest (i.e., hunting and trapping) would not be regulated by federal or state laws or regulations. Wolves could be harvested without a license year-round throughout Montana, with no quotas, thresholds, or bag limits.

A no-management alternative would risk wolf population sustainability and maintenance above population levels mandated by the USFWS. FWP does not support increased pressure on wolves that would cause population declines below standards of established population viability and longevity that may warrant ESA-relisting and subsequent loss of state management authority for the species. More importantly, risking the loss of wolves on the landscape could have several negative impacts to both the wildlife communities to which they belong (see **Chapter 1, Section 1.2.1**) as well as directly contradict the values of some Montanans (see **Chapter 3, Section 3.1.3**). Although this alternative would theoretically limit the potential for and presence of wolf-livestock conflicts, FWP considers this approach impractical and biologically-harmful.

There are also politically based issues that do not align with this alternative. First, Governor Gianforte determined there is a need for the 2023 Wolf Plan to flexibly manage wolves, based on a changing

ecological and sociopolitical environment, for population sustainability and longevity. Further, to uphold its obligation to protect, enhance, and regulate the use of Montana's fish and wildlife resources for public benefit now and in the future (§ 87-1-201, MCA), it is imperative FWP maintains healthy populations of *all* fish and wildlife species and habitats that may be directly or indirectly impacted by wolves. Without the management of wolves, other species in the community may experience changes in their population dynamics and or modify their behaviors, inadvertently impacting the habitat quality and quantity available to all species. It is also the statutorily mandated responsibility of FWP to provide harvest opportunities (i.e., hunting/trapping) of game and furbearer species to the public, as part of Montana's heritage (§ 87-1-901, § 87-1-217, MCA). This includes the opportunity to harvest wolves when populations are robust. Management of classified species is necessary to maintain a stable ecosystem, and thereby, a no-management alternative is impractical and unreasonable. But importantly, FWP is mandated by law to implement legislation regarding the management of wolves (§ 87-1-901 MCA).

Thus, the no-management alternative was dismissed from further, detailed consideration and analysis.

### **Genetic Connectivity**

The combination of high genetic variation among colonizers and reintroduced individuals from original populations, as well as ongoing natural dispersal from neighboring populations, states, and Canada are all adequate to assure long-term population viability. Harvest has no effect on the genetic diversity of wolves at an individual level, and in fact, creates opportunities for wolves to immigrate into nearby groups (Ausband and Waits 2020). Further, there is no evidence that human development (i.e., roads) hinders wolf movement thereby impeding genetic connectivity. There is no credible evidence of a population threat to Montana wolf population from loss of genetic diversity caused by isolation or small population size. With pack distribution and density spatially distributed in a manner to allow for genetic exchange by dispersers, genetic connectivity is not an issue to wolf population longevity.

The genetics of wolves are described in **Chapter 1, Section 1.2.1** and evaluation of genetic connectivity within and between wolf populations was dismissed from further consideration.

# CHAPTER 2. DESCRIPTION OF ALTERNATIVES

## 2.1 INTRODUCTION

This chapter provides background information on the proposed project and describes the alternatives FWP considered. This chapter also describes alternatives that were not carried forward for detailed analysis.

### 2.1.1 ALTERNATIVES ANALYZED

Alternatives to the proposed action were considered based on requirements for the alternatives analysis pursuant to MEPA and its implementing rules (ARM 12.2.428, *et. seq.*). MEPA does not specify the number of alternatives that need to be considered in an EIS; however, any alternative proposed must be reasonable, in that the alternative must be currently achievable and economically feasible, as determined solely by the economic viability for similar projects having similar conditions and physical locations and determined without regard to the economic strength of the specific project sponsor (MCA 75-1-201(1)(b)(iv)(C)). In addition, MEPA requires a meaningful analysis of the *No Action Alternative* in an DEIS.

Under MEPA, “alternative” means “an alternate approach or course of action that would appreciably accomplish the same objectives or results as the *proposed action*; design parameters, mitigation, or controls other than those incorporated into a proposed action by an applicant or by an agency prior to preparation of an EA or draft DEIS; no action or denial; and for agency-initiated actions, a different program or series of activities that would accomplish other objectives or a different use of resources than the proposed program or series of activities. The agency is required to consider only alternatives that are realistic, technologically available, and that represent a course of action that bears a logical relationship to the proposal being evaluated.” ARM 12.2.429(2).

FWP evaluates two alternatives in this DEIS: Alternative 1 – No Action Alternative; Alternative 2 – Proposed Action. Alternatives not carried forward for detailed analysis, for cause, are discussed at the end of this chapter (**2.5 Alternatives Not Carried Forward for Detailed Analysis**).

Table 1. Comparison of key issues between the alternatives.

Issue	1. No action (status quo)	2. Proposed action (FWP preferred)
<b>Values associated with wolves: benefits and challenges of wolf presence in Montana</b>	FWP currently monitors the wolf population (i.e., distribution and abundance), regulates harvest (i.e., hunting and trapping seasons), mitigates conflict including livestock depredation and other problem wolf control, coordinates and authorizes research (i.e., radio-collars packs), conducts public outreach, and utilizes contemporary population estimation tools in order to maintain a recovered and connected wolf population, reduce wolf-livestock conflicts, reduce wolf	In addition to what is described in the <i>No Action Alternative</i> , FWP will provide greater transparency on how wolves are monitored and managed in Montana. The 2023 Wolf Plan would allow FWP biologists and managers to flexibly manage wolves as their densities and distributions change on the landscape in response to varying environmental factors, human-caused mortality, human development, and prey resource availability, as well as to

	impacts on low or declining ungulate populations and ungulate harvest opportunities, and effectively communicate to all parties the relevance and credibility of the harvest while acknowledging the diversity of values among those parties would continue.	contextual changes in the sociopolitical climate.
<b>Population monitoring and research</b>	FWP is committed to modern, scientifically valid, and financially efficient means of monitoring wolves. Research and collaborations to evolve such methods will be ongoing.	FWP would continue effectively monitoring the wolf population, using new and improved techniques as they become available, appropriate, and practical with implementation strategies. The 2023 Wolf Plan describes, in depth, iPOM as the preferred monitoring method due to accuracy, incorporation of uncertainty, and cost efficiency.
<b>Population management</b>	The flexible framework in the 2003 Wolf Plan provides FWP with the flexibility to adjust management contingent on wolf numbers, wolf distribution, public acceptance, prevailing landownership patterns, land uses, prey populations, and other considerations.	With the 2003 Wolf Plan as the foundation, the 2023 Wolf Plan includes the fundamentals of flexible management allowing FWP to accommodate changes in law, political leadership, and overall management strategy, as well as changes in biological, environmental, and sociopolitical environments.
<b>Public harvest opportunities</b>	Following the delisting, wolves have been managed under state authority as a species in need of management. Regulated hunting and trapping was implemented within a scientifically sound framework that maintains a viable and self-sustaining population. Over time, harvest rules and regulations have changed, but have always been consistent with ensuring a minimum of 150 wolves and 15 breeding pairs.	In addition to what is described in the No Action Alternative, FWP would continue to use harvest strategies as a wildlife management tool. Lethal management strategies, regulations and rules, and harvest structure parameters will continue to be flexible based on changing biological, ecological, and sociopolitical environments, and maintain integrity based on science. FWP will ensure adequate forums and opportunities for diverse public input into annual harvest regulation decisions.
<b>Other considerations</b>	Travel and access management, den and rendezvous sites, and captive wolves or wolf-dog hybrids are monitored and managed as necessary.	Travel and access management, den and rendezvous sites, and captive wolves or wolf-dog hybrids are monitored and managed as necessary.
<b>FWP staff and locations</b>	FWP would continue supporting wolf specialists located strategically around the state.	FWP would continue supporting wolf specialists located strategically around the state.
<b>Wolf-livestock conflicts</b>	FWP sees no realistic future in which there will be no need at all for responding to wolf-livestock conflict. The 2003 Wolf Plan let to the Montana	FWP would continue its active partnerships, maintain efficient responses to wolf-livestock conflict, and explore and adopt emerging

	Livestock Loss Board (MLLB) Payments Program to address the economic impacts of verified wolf-caused livestock losses.	technologies and methodologies to prevent and minimize wolf-livestock conflict. The FWP-USDA-WS MOU will be maintained.
<b>Wolf-human conflicts</b>	Human safety related to carnivores is a state priority and wolf-human conflicts will be addressed efficiently.	Human safety related to carnivores is a state priority and wolf-human conflicts will be addressed efficiently.
<b>Education and outreach program</b>	Efforts would remain aimed at people living, working, and recreating in wolf habitat, targeting both new and long-term residents. This includes various resources that address wolf-livestock conflict management, wolf harvest, and hunting/trapping regulations.	Building on current efforts, FWP will seek to continually improve transparency and provide information to the public to enhance public understanding of Montana’s wolf monitoring and management strategies.
<b>Wolf program funding</b>	In order to maintain FWP's eligibility to receive matching federal funding under the Federal Aid in Wildlife Restoration Act (Pittman-Robertson or PR), the Montana Legislature agreed to use hunting license revenue only for wildlife management (MCA 87-1-708). Most of this funding is generated through excise taxes on firearms, ammunition, and archery equipment. Federal funding matches state license revenue to fund wildlife surveys, research, hunter education, and other management activities. Wildlife surveys and inventories and other approved projects typically receive 75% federal funding and 25% state funding from license revenues.	In order to maintain FWP's eligibility to receive matching federal funding under the Federal Aid in Wildlife Restoration Act (Pittman-Robertson or PR), the Montana Legislature agreed to use hunting license revenue only for wildlife management (MCA 87-1-708). Most of this funding is generated through excise taxes on firearms, ammunition, and archery equipment. Federal funding matches state license revenue to fund wildlife surveys, research, hunter education, and other management activities. Wildlife surveys and inventories and other approved projects typically receive 75% federal funding and 25% state funding from license revenues.
<b>Public engagement process</b>	The public has several opportunities to participate in various legislative and commission processes. As part of the implementation process of such management actions via the commission, the public has been routinely encouraged to provide comment.	Building on current practices, FWP intends to enhance engagement and inclusion with the public and increase intergovernmental, interagency, and tribal coordination.

## 2.2 PAST AND EXISTING RESOURCE MANAGEMENT STRATEGIES AND PLANS

Since the delisting of wolves in 2011, FWP has and currently manages wolves under the 2003 Wolf Plan (approved by USFWS in 2004). Wolves are managed under state authority as a species in need of management. In the 2003 Wolf Plan, a *minimum* benchmark of 150 wolves and 15 breeding pairs was established to avoid ESA recovery. The 2003 Wolf Plan describes a spectrum of management activities intended to maintain viable populations of wolves and their prey as well as resolve wolf-livestock

conflicts. The management philosophies and tools were intended and have worked to assure the long-term persistence of wolves in Montana by carefully balancing the complex biological, social, economic, and political aspects of wolf management. Currently, FWP develops and implements wolf harvest strategies that maintain a recovered and connected wolf population, reduce wolf-livestock conflicts, reduce wolf impacts on low or declining ungulate populations and ungulate harvest opportunities, and effectively communicates to all parties the relevance and credibility of the harvest while acknowledging the diversity of values among those parties. Additionally, FWP monitors the wolf population through scientifically-sound contemporary methods, coordinates and authorizes research to obtain new information on Montana's wolves, and conducts public education and outreach. The flexible management framework in the 2003 Wolf Plan provides FWP with the flexibility to adjust management contingent on wolf numbers, wolf distribution, public acceptance, prevailing landownership patterns, land uses, prey populations, and other considerations.

## 2.3 ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Under the *No Action Alternative*, FWP would continue to manage wolves as they are currently managed. The environmental, social, and economic conditions described in **Chapter 3** would continue and the approach to managing wolf populations will remain as status quo. However, significant variation in public views of wolves and their role in Montana and the subsequent lack of an accepted approach has caused challenges both for agency managers and the public at large. The selection of this alternative would eliminate the *Proposed Action Alternative* (i.e., development of the 2023 Wolf Plan would not occur). Therefore, no additional impacts to the physical environment or human population in the analysis area would occur. The *No Action Alternative* forms the baseline from which the potential impacts of the *Proposed Action Alternative* can be measured. As a result, FWP would continue to manage wolves under the 2003 Wolf Plan and management recommendations would be limited in transparency because contemporary strategies of population monitoring and management are not specifically described.

Since the early 2000s, wolf abundance has increased, and wolf-related legislation has changed population and conflict management tools and their utility. The original population monitoring metrics, techniques, and described response to livestock depredations are outdated and inefficient. For example, if FWP reverted to using minimum counts, the result would be a count of wolves that is less than the population, and thereby would not constitute a population estimate. The degree to which it under-represents the true population will be unknown, and FWP will have no estimate of uncertainty to gauge how accurate or precise it is. Ultimately, the *No Action Alternative* (i.e., the 2003 Wolf Plan) does not incorporate current science, improved monitoring methods, changes in harvest management tools, or updated depredation prevention approaches and response protocols, and as such, does not meet FWP's objective of providing the affected public with an adequate level of transparency in how the gray wolf is managed in Montana.

Under the *No Action Alternative*, little would change compared with the current situation. With ESA delisting of wolves, authority for wolf management was given to the state, thereby FWP would continue to manage wolves in Montana. FWP would expect wolf abundance, population distribution, and events of wolf-livestock conflict to remain stable with the current harvest regulations. However, if FWP reverted to 2003 methods, FWP would lose the ability to determine and predict the effects of wolf harvest on population size, because the minimum count would have an unknown relationship to the population size estimate. Wolf-livestock mitigation would revert to incremental removals following

depredation, which would result in more depredations and more wolf mortalities overall, based on existing research on lethal removal. The benchmark of a minimum of 150 wolves and 15 breeding pairs (or another stated minimum threshold if modified, in coordination with the USFWS benchmark for relisting) would be documented by FWP field staff minimum counts and FWP would continue to use regulated harvest as a wildlife management tool. FWP would expect continued uncertainty, lack of transparency, limited understanding, and poor representation of the breadth of values by the public.

## **2.4 ALTERNATIVE 2 – PROPOSED ACTION**

Alternative 2 is adoption and implementation of the statewide 2023 Wolf Plan as proposed by FWP. Over the last 20 years, new and improved management approaches and tools have been developed and new science about wolf ecology has emerged. Although not specifically described in the 2003 Wolf Plan, these new approaches, tools, and science have been incorporated into Montana’s comprehensive wolf management strategy. Governor Gianforte directed FWP to develop a new wolf management plan which would include updated information on how wolves are currently managed in Montana. The 2023 Wolf Plan would afford FWP biologists and managers with various refinements to management strategies that reflect current science (i.e., updated methods for population monitoring and depredation prevention and response), which would provide the flexibility necessary to effectively manage wolves as their densities and distributions change on the landscape in response to varying environmental factors, human development, and prey resource availability. Using the 2003 Wolf Plan as a basis, the 2023 Wolf Plan would provide the foundation for future FWP recommendations regarding conservation and management of wolves, and would provide updates on the various aspect of wolf conservation and management.

Key modifications from the current management approach (Alternative 1, No Action) include:

- Articulate contemporary updates in wolf-related research;
- Describe new and available wolf management tools and science-based methods employed by FWP;
- Provide FWP with the flexibility needed to incorporate new wolf management science and tools, as they become available as practical, implementable strategies;
- Improve transparency related to wolf management practices in Montana;
- Describe the public engagement process as new information related to evolving wolf management strategies in Montana becomes available.

### **2.4.1 DESCRIPTION OF PROPOSED ACTION**

**Values associated with wolves: benefits and challenges of wolf presence in Montana**

*Same as the No Action Alternative.* More information can be found in **Chapter 3, Section 3.1.3.**

#### **Population monitoring and research**

The wolf monitoring program documents population status and trends through time. Wolf packs were intensively monitored year-round beginning with their return to the northwestern part of Montana in the 1980s, via natural immigration from Canada. Objectives for monitoring during the period of recovery were driven by the USFWS’s recovery criteria—30 breeding pairs for 3 consecutive years in Montana, Idaho, and Wyoming. Similar metrics of population status were used from the time recovery criteria

were met in 2002, through delisting in 2011, and for the 5 years thereafter when the USFWS retained oversight after delisting. These population monitoring criteria and methods were appropriate and achievable when the wolf population was small and recovering. In the early years, most wolf packs had radio-collared individuals and intensive monitoring was possible to identify new packs and most individuals within packs. Weekly updates were appropriate during this time because monitoring a smaller population was practical and necessary. In later years, the minimum count of wolves exceeded 500 individuals distributed across more than 25,000 square miles of mostly rugged and remote terrain in western Montana. Therefore, the wolf population effectively outgrew the staffing and funding necessary to maintain this highly resource-intensive monitoring strategy. Further, this approach consistently underestimated the total number of wolves and was thereby ineffective in providing accurate population estimation (Figure 5). Out of necessity and practicality, FWP has moved to more cost-effective modeling methods for monitoring wolves which more accurately and reliably describes population estimates and accounts for uncertainty (credible intervals). Contrarily, continuing to produce a minimum count when populations are large more accurately reflects total effort (dollars and related resources spent) than an accurate population abundance estimate.

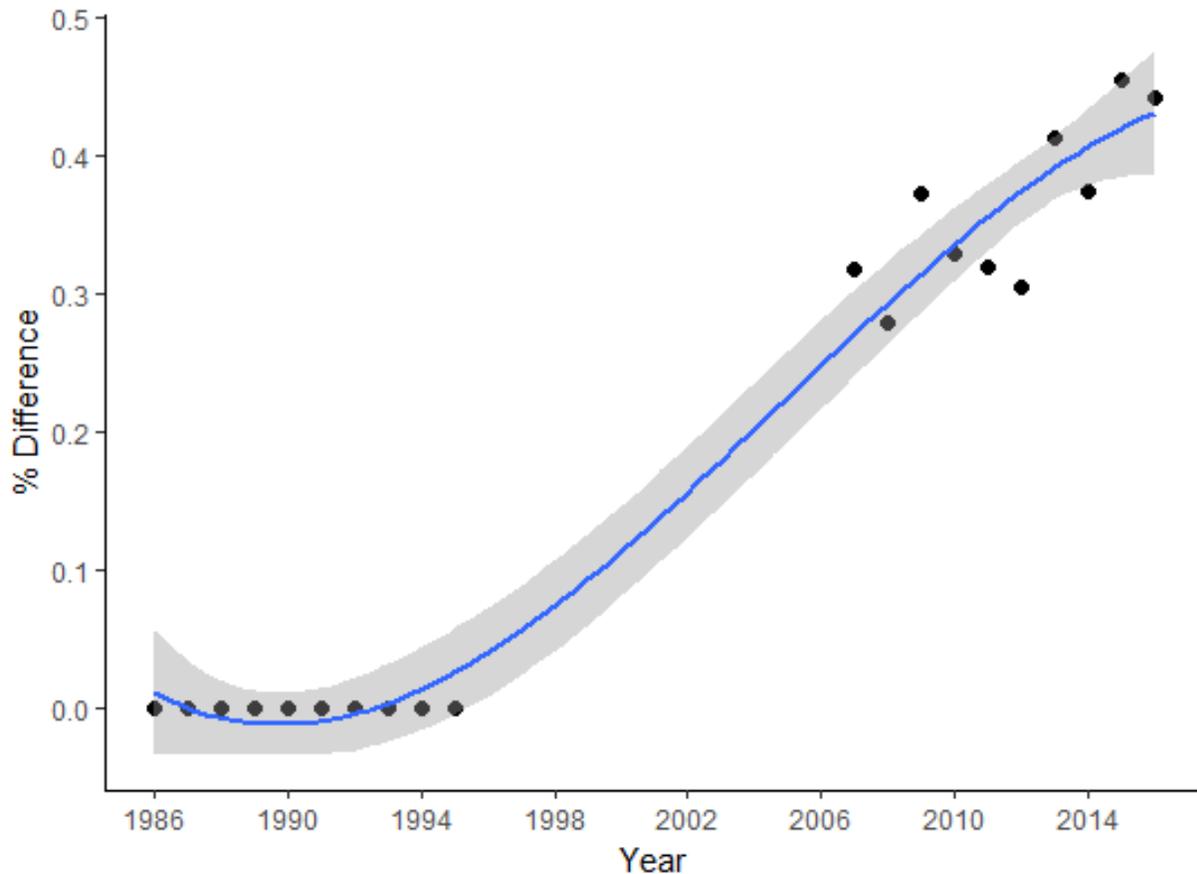


Figure 5. Predicted % difference in abundance estimates and minimum counts over time (blue line) with 95% confidence limits and the actual % difference in abundance estimates and minimum counts (black circles). With increased population sizes in recent years, minimum counts are not accurate or cost-effective when compared to contemporary population abundance estimate techniques. Minimum counts data from 1986-1995 were accurate and assumed to represent a census of the small population at the time, therefore the percent difference between abundance estimates and minimum counts was 0. From 2006 to present, population estimates were calculated using POM, thereby producing differences between abundance estimates and minimum counts (FWP 2018).

FWP first began considering alternative approaches to monitoring the wolf population in 2006 through a collaborative effort with the University of Montana Cooperative Wildlife Research Unit. The primary objective was to find an alternative approach to wolf monitoring that would yield statistically reliable estimates of the number of wolves, the number of wolf packs, and the number of breeding pairs (Glenn et al. 2011). Field-based counting of individual wolves and packs is costly, cumbersome, and less effective with larger population sizes, and therefore adversely impacts agency resources necessary to effectively manage wolves while often underestimating population abundance, the accurate estimation of which is key to proper management. As a result, a method applicable to a sparsely distributed and elusive carnivore population was developed that used hunter observations as a cost-effective means of gathering biological data to estimate the area occupied by wolves in Montana (i.e., the patch occupancy model, or POM). POM was sensitive to sizes of packs and territories, and required accurate and reliable estimates for both. However, this approach was developed prior to the implementation of wolf hunting and trapping seasons associated with public harvest, and, with the cessation of federal funding for wolf monitoring, a reduction in reliance on intensive counts of the wolf population was necessary. Therefore, models to estimate pack and territory size were developed and integrated into POM. This refined tool to estimate the state's wolf population is the integrated patch occupancy model (iPOM).

iPOM is a modern, scientifically peer-reviewed, and cost-effective means of monitoring wolves, and is the most efficient method to document wolf population numbers and trends accurately across the distribution of wolves in Montana (Sells et al. 2020, Sells et al. 2021, Sells et al. 2022a, Sells et al. 2022b). The iPOM method uses annual big game hunter surveys, known wolf locations, habitat covariates, and estimates of wolf territory size and pack size to estimate wolf distribution and population size across the state (Sells et al. 2020). iPOM estimates the extent of wolf distribution in Montana, and a territory model predicts territory sizes; together, these models predict the number of packs in a given area. A group size model predicts pack sizes. Total abundance estimates are derived by combining the estimated number of packs and pack sizes, while also accounting for lone and dispersing wolves, which are generally not accounted for with other strategies. iPOM estimates of wolf population size are the preferred monitoring method due to accuracy, confidence intervals, and cost efficiency, and FWP will use iPOM as relevant and appropriate.

#### *Integrated Patch Occupancy Modeling Methods*

To predict where wolves occur in Montana each year, FWP fits a multi-season false-positives occupancy model in a Bayesian context (Bassing et al. 2019). This work built on an earlier occupancy model (Miller et al. 2013, Rich et al. 2013, Inman et al. 2020). Following those authors, FWP uses an observation "iPOM grid" across Montana, composed of 600 km<sup>2</sup> cells. FWP assigns locations of wolves in packs to grid cells, based on monitoring effort by FWP wolf specialists and wolf sightings reported by hunters each fall. Wolf specialists monitor packs each year to verify presence using trail cameras, visual observations, and telemetry collars, and use these data to demarcate approximate territory centroids for packs. FWP conducts annual Hunter Harvest Surveys of a random sample of 50,000 – 80,000 resident deer and elk hunters annually to obtain wolf sighting reports. Hunters spend 1.8 – 2.2 million hunter days each fall pursuing deer and elk, providing many observers across Montana. Hunters are queried about dates and locations of any sightings of groups of 2 – 25 wolves. To develop encounter histories, FWP divides the 5-week general rifle season (occurring each year around late Oct. through Nov. or early Dec.) into one-week encounter periods and then maps locations of pack centroids and hunter observations for each week. Based on past work (Miller et al. 2013, Rich et al. 2013, Inman et al. 2020), FWP includes model covariates for detection as: 1) hunter days per km<sup>2</sup> in each hunting district (an index to spatial effort), 2) proportion of mapped wolf observations (a correction for effort, accounting for

number of hunter observations with coordinates versus total reported, including any sightings with vague location descriptions), 3) densities of low-use forested and non-forested roads (indices of spatial accessibility), 4) a spatial autocovariate (proportion of neighboring cells with wolves seen out to a mean dispersal distance of 100 km), and 5) patch area sampled (because smaller cells on the border of Montana, National Parks, and tribal lands have less hunting activity and therefore less opportunity for hunters to see wolves). FWP also includes cell size as a nuisance parameter to account for varying cell sizes. Model covariates for occupancy, colonization, and local extinction include a principal component constructed from several autocorrelated environmental covariates (percent forest cover, slope, elevation, latitude, percent low use forest roads, and human population density), and recency (number of years with verified pack locations in the previous 5 years). Using these pack locations and model covariates, FWP fits the multi-season false-positives occupancy model to estimate  $\psi$ , the probability of occupancy ( $\psi$ ). FWP uses pack centroids to estimate probabilities of false positives, true positives, and false negatives (Miller et al. 2013). FWP estimates  $\psi$  for tribal lands and national parks, where no hunter survey data are available, via modeled covariates. FWP uses Markov chain Monte Carlo (MCMC; Brooks 2003) methods in a Bayesian framework to fit the occupancy model using program R 3.4.1 (R Core Team 2020) and package rjags (Plummer et al. 2019) that calls on program JAGS 4.2.0 (Plummer 2003). FWP runs 3 chains for 10,000 iterations, after an adaptation phase of 10,000 iterations and a burn-in of 10,000 iterations. MCMC chains are not thinned.

FWP uses a recently developed mechanistic territory model to predict territory size (Sells and Mitchell 2020, Sells et al. 2020, 2021). The territory model is a spatially explicit, agent-based model representing the hypothesis that wolves are adapted to select economical territories that maximize food benefits and reduce costs of travel, competition, and mortality risk. After calibrating the model using wolf location data collected from 2014 – 2018 (Sells et al. 2020), the model provides territory size predictions through simulations in NetLogo 6.1.1 (Wilensky 1999). The model demonstrates the strong effect of competition on resulting space use (Sells and Mitchell 2020; Sells et al. 2020, 2021). Accordingly, FWP applies the model to predict territory sizes at a wide range of possible pack densities and resulting levels of competition. FWP uses a density identifier model (Sells et al. 2020) to predict levels of competition in each area of Montana for each year. FWP then uses the territory sizes predicted at the given level of competition as estimates of territory size in each area of the state.

FWP uses a recently developed group size model (Sells et al. 2020) to predict pack sizes in each 600 km<sup>2</sup> iPOM grid cell. The model is based on mechanisms hypothesized to influence wolf pack size and developed using 14 years of wolf pack data. The generalized linear mixed effects model includes effects of pack density, terrain ruggedness, harvest intensity, and control removals. Pack density is the long-term (2005 – 2018) mean pack density in the iPOM grid cell, which served as an index to density trends (Sells et al. 2020). Ruggedness is terrain ruggedness in the iPOM grid cell. Harvest intensity is categorized as “none” when no harvest was allowed, “restricted” if 2009 and 2011 rules were followed (statewide harvest was limited by a quota, seasons were shorter, bag limits were low, and trapping was prohibited), and “liberal” if 2012 – 2021 rules were followed (statewide harvest quotas were removed, seasons were longer, bag limits were higher, and trapping was allowed). Control removals are reported numbers of wolves removed for depredations in the iPOM grid cell that year. Ecoregion defines in which ecoregion the iPOM grid cell fell (epa.gov). The unique identifier for the iPOM grid cell is included as a random effect to account for repeated observations among years. FWP applies the model to each iPOM grid cell, each year, to predict local pack size.

FWP estimates numbers of packs and wolves for each year by combining predictions from the 3 models (Figure 6) using an integrated approach that includes the following three calculations (Sells et al. 2022b):

1. FWP calculates mean estimated occupancy ( $\bar{\psi}$ ) across iPOM grid cells, and then calculates area occupied ( $\text{area}_{\text{occupied}}$ ) as

$$\text{area}_{\text{occupied}} = \bar{\psi} \times \sum \text{grid}_{\text{area}}$$

where  $\sum \text{grid}_{\text{area}}$  was the sum of grid cell areas.

2. FWP calculates number of estimated packs as

$$N_{\text{packs}} = \text{area}_{\text{occupied}} \div \text{territory}_{\text{size}}$$

where values for  $\text{territory}_{\text{size}}$  were drawn with replacement for each iteration of the MCMC chain from the distribution of territory sizes predicted by the territory model at the specific grid cell. Values for  $\text{territory}_{\text{size}}$  were therefore spatially explicit and biologically appropriate to local conditions each year and accounted for uncertainty.

3. FWP calculates number of wolves as

$$N_{\text{wolves}} = N_{\text{packs}} \times \text{pack}_{\text{size}} \times \text{lone}_{\text{rate}}$$

where  $\text{lone}_{\text{rate}}$  accounted for lone and dispersing wolves. For  $\text{pack}_{\text{size}}$ , FWP draws for each iteration of the MCMC chain a value from the distribution of group sizes predicted at the specific grid cell. This provided spatially explicit and biologically appropriate values for local conditions each year while incorporating model uncertainty about pack size. FWP models  $\text{lone}_{\text{rate}}$  by drawing for each iteration of the MCMC chain values from a normal distribution assuming a mean of 1.125 and standard deviation of 0.025. This yielded a disperser rate of 12.5% and incorporated variation and uncertainty around this rate, as 95% of values drawn were 7.6 – 17.4%. We selected these values based on studies documenting that 10 – 15% of wolf populations are comprised of lone or dispersing wolves (Fuller et al. 2003). This is consistent with Idaho’s calculations for lone wolves (Holyan et al. 2013) and slightly more conservative than Minnesota’s calculations, which add 15% (Erb et al. 2018). To account for uncertainty and calculate credible intervals (CI’s) for all parameters, FWP retains posterior estimates of 10,000 values for each and calculated the median value and 2.5% and 97.5% values (creating 95% CI’s) for  $\text{area}_{\text{occupied}}$ ,  $\text{territory}_{\text{size}}$ ,  $\text{pack}_{\text{size}}$ ,  $N_{\text{packs}}$ , and  $N_{\text{wolves}}$ .

FWP calculates density of packs per 1,000 km<sup>2</sup>, wolves per 1,000 km<sup>2</sup>, and population growth ( $\lambda$ ). FWP repeats these calculations for FWP management administrative regions by completing each step described above at each subsetted group of grid cells by region. Grid cells were categorized by the region in which the majority of their areas fell. The development, justification, and implementation of the iPOM model are described in peer-reviewed scientific publications and can be found under the Research tab and Population Monitoring section of the FWP website ([fwp.mt.gov/conservation/wildlife-management/wolf](http://fwp.mt.gov/conservation/wildlife-management/wolf)).

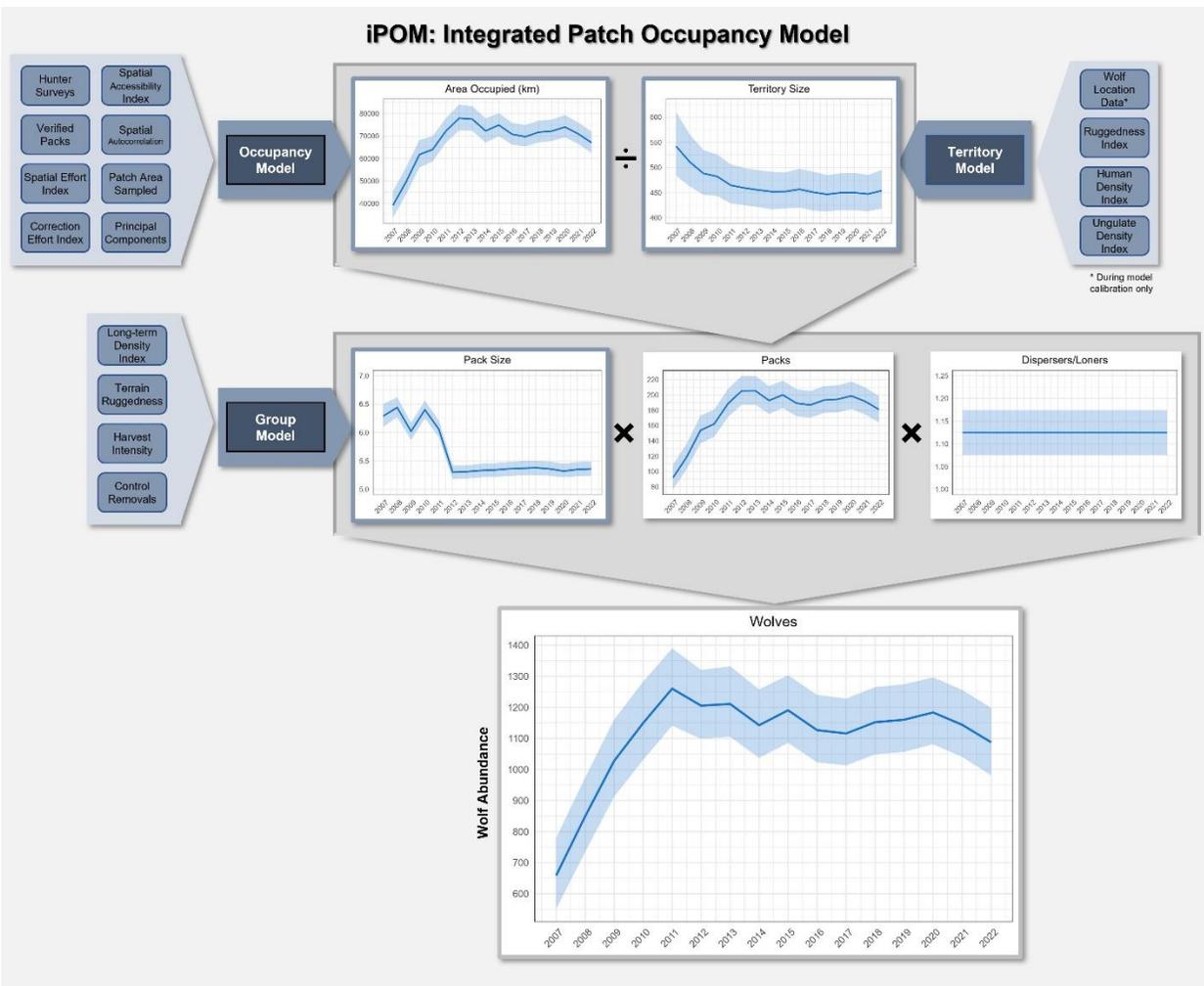


Figure 6. Schematic for method of estimating the area occupied by wolves, number of wolf packs and number of wolves in Montana by calendar year following the population estimate, 2007 – 2022 using an Integrated Patch Model. Graphs show statewide estimates over time. Ribbons indicate 95% credible intervals (Parks et al. 2023).

Wolves will continue to be monitored using contemporary science-based methodologies. If new and improved techniques become available based on new research and the peer-review process (and through validation with empirical and simulated data), those methods may be implemented under the 2023 Wolf Plan, when practical and appropriate at large scales. Accurate and timely information about any wildlife population is critical to make informed management decisions, and minimum counts and breeding pairs have become increasingly difficult to document with the current wolf population in the state. Although once the primary tools to monitor wolves, with larger wolf populations and even when combined, these data are no longer representative of abundance, density, and population estimates because of the discrepancy between minimal number of observations relative to the overall population size. FWP emphasizes and deeply values the use of scientific principles to estimate population sizes and distributions and uses these estimates to inform wolf harvest management recommendations.

*Field Monitoring, Data Collection, and Research*

FWP is confident the wolf population estimate and trends provided by iPOM are accurate and scientifically valid evidence that can be used to assess wolf status relative to the criteria outlined in the 2023 Wolf Plan. However, wolf specialists and area biologists still regularly collect data on wolves in the field. Because wolf specialists continue to radio-collar wolves (§ 87-5-132, MCA) and conduct non-invasive surveys in the field, the iPOM model will be regularly supplemented with field data along with data collected from harvested and conflict-removed individuals. For example, wolf specialists verify hunter observations with known wolf pack centroids to improve occupancy estimation and collect conflict removal data for integration into population estimation. While this data is incorporated into iPOM, other data is collected for general monitoring of trend and use in future evaluations. Spatiotemporal data from radio-collared wolves, for example, provides information on wolf pack distribution, individual territory boundaries, how a pack moves through and uses its territory, locations of wolf den and rendezvous sites, dispersal, and interactions between packs. “Non-invasive” monitoring methods gather information without live-capturing and handling animals. Examples of non-invasive methods are track counts to document pack size (best with snow cover), howling surveys (best at rendezvous sites where pups are present), observation report summaries, remote photography (Loonam et al. 2020), and profiling of genetic material obtained passively from hair or scat samples (Bischof et al. 2020). These methods can yield valuable information on occupancy, distribution, densities, and abundance; however, for some monitoring objectives, these processes are not efficient, effective, accurate, or precise.

Although FWP personnel carry out the primary monitoring duties, opportunities for research collaboration with other agencies, universities, non-profit organizations, volunteers, and tribal wildlife authorities will be pursued. Permits to conduct research, particularly if live capture is required, are issued by FWP to ensure that the work is scientifically justified and conducted in an ethical, responsible manner. FWP partners with University of Montana, Montana State University, USFWS, United States Forest Service (USFS), National Park Service (NPS), private landowners, and others to conduct research pertaining to predator-prey interactions (see References for peer-reviewed scientific literature that includes FWP sponsorship, partnership, and or participation). FWP capitalizes on opportunistic ways to collect data, such as DNA sampling from harvested or removed individuals to continue surveillance of population genetic connectivity and viability. Additionally, human dimensions studies use surveys and questionnaires to quantify human values, beliefs, and attitudes toward wolves on various topics. FWP conducts human dimensions research and identifies problems or areas of public concern so that targeted work efforts are more effective. These efforts help to identify special management needs, opportunities, and constraints.

Additionally, FWP and the Montana Cooperative Wildlife Research Unit at the University of Montana are partnering to develop a wolf harvest management strategy evaluation (hereafter, MSE; Punt et al. 2016). MSE is a tool to simulate the workings of a harvested population and allows managers to test whether potential management strategies can achieve pre-defined fundamental objectives (Bunnefield et al. 2011). MSE considers a full range of uncertainty and helps decision-makers consider long-term trade-offs among the management objectives, thus focusing on wolf population viability and longevity alongside the implementation of harvest management strategies to forecast populations into the future. Models will be constructed based on current understanding and data, and then management strategies are simulated through time to provide predictions about their relative effects and performance at meeting fundamental objectives. Simulated management strategies include different monitoring programs or levels of monitoring intensity, as well as varying levels of harvest control rules (for example, liberal or restrictive regulations applied when populations are above or below some threshold, respectively) and uncertainty in the effects of regulations on realized harvest to reflect that regulations

do not always prescribe exact harvest levels. MSE would allow FWP to better examine how or if management decisions (or the population) might be affected with different combinations of monitoring schemes and harvest control rules. Further, incorporating structural uncertainty about how the population works (e.g., the relative effect of harvest or density dependence on population trend) along with variable monitoring and harvest control rules in an MSE permits analyses related to whether or what type of additional monitoring or research data would help select harvest control rules that ensure population conservation. Several different performance metrics related to fundamental objectives can then be tracked and summarized for each management strategy based on the simulations, essentially allowing for experimental application of different strategies to help choose those more likely to be effective over the long term compared to other alternatives (Marasco et al. 2007). A wolf harvest MSE could (1) incorporate uncertainty in population size, effects of regulations on total and regional harvest, effects of harvest or density dependence on population size and trend at statewide and regional scales, and the effects of harvest methods and total harvest on public sentiment, and (2) help elucidate and evaluate tradeoffs in management strategies (monitoring strategies and harvest control rules) over longer time frames than the current short-term (annual) decisions on harvest management.

### **Population management**

FWP implements flexible management strategies to ensure population sustainability and longevity as ecological and sociopolitical environments change, to accommodate changes in law and political leadership, and to incorporate new and available science into practical and applied management strategies. Adaptive management refers to the formal structured decision-making process but is a term often used when meaning flexible management. Management decisions are based on the current and predicted future status of resources (e.g., FWP staffing, funding), considering uncertainty, objectives, and constraints. Research and management monitoring of wolf density and distribution are conducted to evaluate outcomes of previous decisions. Management actions change over time based on current wolf population status and trends compared with management objectives. As a result, FWP evaluates and periodically changes how wolves are monitored and managed. Further, FWP incorporates new wolf-related science and information as it becomes available and modifies its management approach as appropriate and practical. What is consistent in the wolf program, however, are the following objectives that guide implementation. These management objectives were originally developed to inform the commission's setting of the 2010 wolf hunting season, before wolves were relisted later that year, as described in Runge et al. (2013). Since that time, these objectives have been incorporated into most wolf season proposals drafted by FWP and acted upon by the commission. The originally written third objective was changed from listing "livestock producers, hunters, and other stakeholders" to "all stakeholders" to be inclusive of the diversity of values pertaining to wolves. These management objectives include:

1. Maintain a viable and connected wolf population in Montana;
2. Maintain authority for State of Montana to manage wolves;
3. Maintain positive and effective working relationships with all stakeholders;
4. Reduce wolf impacts on:
  - a. Livestock; and
  - b. big game populations.
5. Maintain sustainable hunter opportunity for wolves;
6. Maintain sustainable hunter opportunity for ungulates;
7. Increase broad public acceptance of sustainable harvest and hunter opportunity as part of wolf conservation;
8. Enhance open and effective communication to better inform decisions; and
9. Learn and improve as we go.

FWP will maintain the population baseline derived from the federal recovery definition of 150 wolves and 15 breeding pairs (or another stated minimum threshold if modified, in coordination with the USFWS benchmark for ESA recovery [50 CFR Part 17, Docket No. FWS–R6–ES–2011–0032; 92220–1113–0000; ABC Code: C6]). Further, the minimum baseline metric used will be modified to the number of wolves and wolf packs needed to sustain and maintain a viable wolf population. By dividing the mean estimate of population size from iPOM by the mean number of documented breeding pairs in Montana from 2011–2017, the number of wolves per breeding pair can be estimated. By then multiplying the number of wolves needed per breeding pair by 15 (the federal minimum requirement for breeding pairs), an estimate of the number of wolves needed to ensure Montana has at least 15 breeding pairs can be calculated.

Using iPOM population estimates for the statewide number of wolves and documented breeding pairs from 2011 to 2017 generates 29.15 wolves/breeding pair. For comparison, the newer numbers (2018–2022) provide an estimate of 20.36 wolves/breeding pair. The long-term 10-year average (2012–2022) gives an estimate of 24.65 wolves/breeding pair. These estimates suggest a range of 305–437 wolves would be needed to support 15 breeding pairs, with a 10-year average of about 370 wolves. This range is higher than the number of individuals predicted to equate to 15 breeding pairs based on a linear regression (Figure 7; Mills and Thompson 2023).

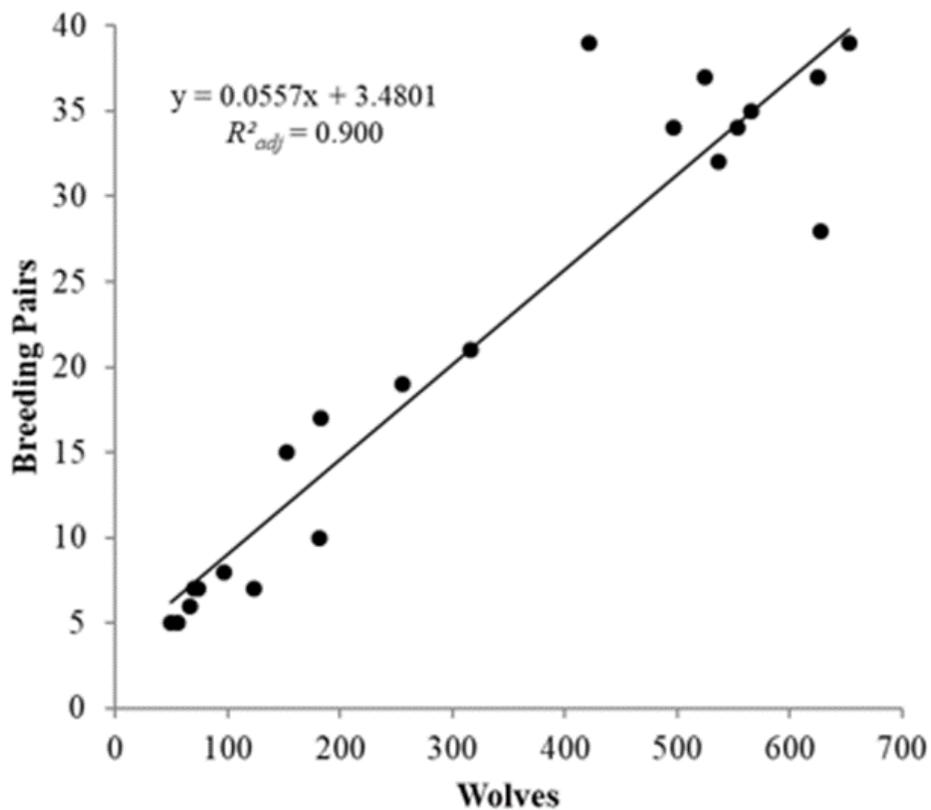


Figure 7. Linear regression relationship between number of wolves and respective number of breeding pairs present in Montana at the end of each calendar year, 1995–2015 (Mills and Thompson 2023).

To be cautious in maintaining delisted status and state management of wolves, FWP will use 450 wolves as determined by iPOM, as the benchmark to ensure the population maintains at least 15 breeding pairs, which also surpasses the minimum requirement of 150 wolves. That number may change if the

monitoring methods change in the future. While minimum counts and documented breeding pairs provided valuable information on wolf population trends in the early days after recovery, those metrics became increasingly difficult to document at a meaningful scale and less representative of the overall population with the rapidly growing wolf population. To address this concern, Montana progressed to population estimation via iPOM to balance resources with population monitoring needs. Because this update also led to changes in field monitoring methods, recent efforts to document breeding pairs may not be consistent with earlier years. Ultimately, the shift from reporting the minimum number of breeding pairs to the number of wolves equivalent to the number of breeding pairs will improve consistency with updated population monitoring methods and outputs from iPOM (total estimated number of wolves) that would ensure the metric used for a minimum threshold is current relative to monitoring methods.

While a minimum baseline will be used to ensure Montana maintains management authority for wolves, FWP does not administratively declare an upper limit of wolves in the state in the sense of a “cap.” Section 87-1-901, MCA, passed as Senate Bill 314 by the 2021 Montana Legislature, states that, “the commission shall establish by rule hunting and trapping seasons for wolves with the intent to reduce the wolf population in this state to a sustainable level, but not less than the number of wolves necessary to support at least 15 breeding pairs.” The population at the end of 2020, prior to passage of Senate Bill 314 was 1,177 (1,069–1,290) wolves. To clarify, FWP will manage according to legislative and commission direction to reduce the population. Should the wolf population decline to the point it approaches 450 wolves (the minimum number of wolves needed to ensure 15 breeding pairs) FWP would shift management strategies.

FWP will continue using iPOM for population monitoring, especially when the wolf population is large. iPOM produces valid population estimates, but uncertainty resulting from the use of relatively coarse data inputs and compounding errors is a concern. Therefore, if the population were to approach the minimum number of wolves necessary to sustain 15 breeding pairs or 450 wolves, more intensive monitoring would be required to ensure the population remains healthy and is reproducing at an acceptable rate. This might necessitate a return to former monitoring strategies using minimum counts of wolves, packs, and breeding pairs based on intensive radio-collaring and monitoring of radio-collared animals, which, as stated, has its own limitations (i.e., bias toward underestimating population size). Any need for more detailed, field-based minimum counts may require more funding and staff than it previously had, given the wider distribution of wolves compared to 10-20 years ago and wariness of wolves due to public harvest, thereby making wolves more difficult to radio-collar and observe. Funding is described in Part VIII. Additionally, FWP will continue to invest in applied science (by FWP and others) to improve the monitoring and management of wolves into the future. FWP will adopt the findings and recommendations from future applied science as warranted and then practically implementable.

Wolves occupy much of the predicted distribution area in Montana (Figure 8). In the last decade, expansion in wolf distribution (i.e., recolonization of new areas) has subsided although amount and availability of suitable habitat is not a limiting factor. Wolves primarily occupy western Montana, and wolf distributions are discontinuous because of marginal habitat conditions for ungulates or concentrated human settlements in intermountain valleys. In eastern Montana, the higher frequency with which wolves conflict with livestock on public and private land makes it unlikely that a wolf pack could be sustained over the long term, although dispersing wolves travel through some unsuitable habitats. However, wolf distribution would not be artificially restricted if social tolerance permits wolf presence. Indeed, the general distribution of all wildlife species in Montana is determined by the interaction of species’ ecological requirements and human tolerance. FWP intends to balance wolf

distribution and densities with the diverse needs of the public, private landowners, and the various land uses in Montana. FWP does not have specific objectives for the distribution of wolves. Wolves could occur and persist anywhere in the state where they are tolerated (i.e., based on wolf conflict).

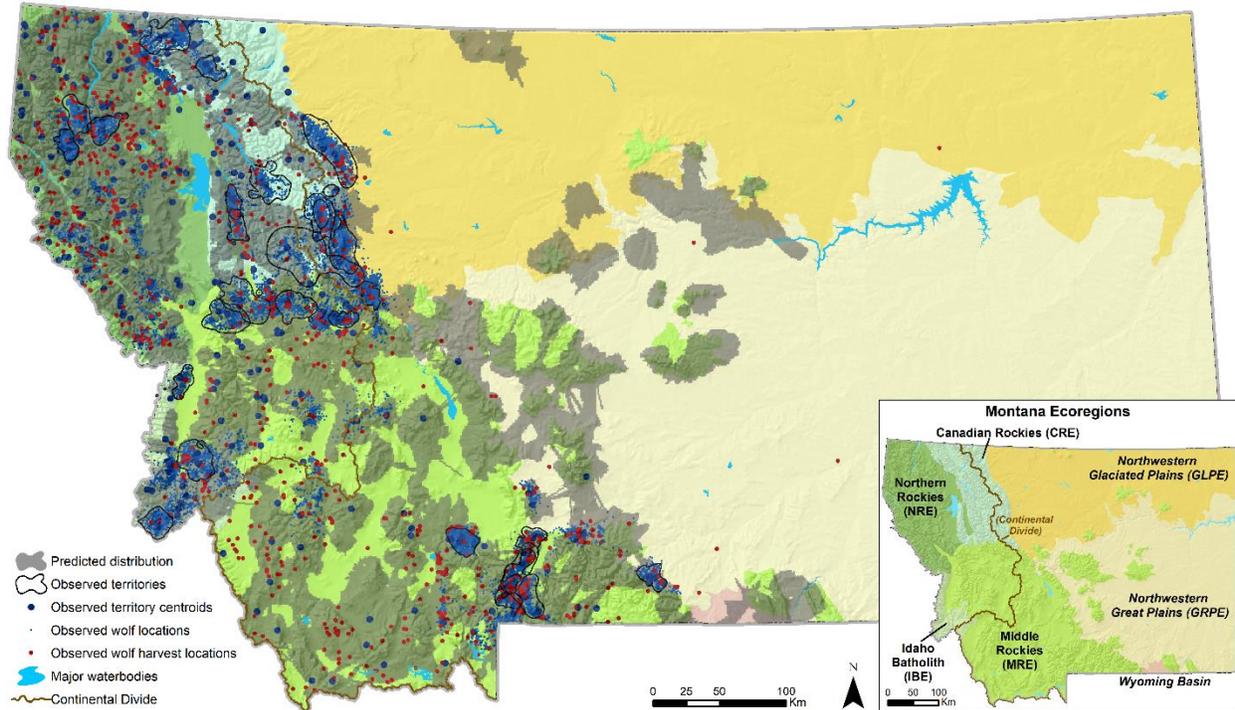


Figure 8. Predicted distribution of territories for 2014–2019 on a 1-km<sup>2</sup> grid (gray shading), alongside observed locations of wolves during this period (territory centroids—large blue dots, GPS locations for collared individuals—small blue dots, and harvest mortality locations—red dots). Observed territories are outlined in black (Sells et al. 2020).

Populations and distributions will likely fluctuate because of changes in policy, advocacy, harvest seasons and their results, specific localized social issues, and ecological processes. FWP staff will continue to use population modeling to provide decision-makers (FWP Director, Fish and Wildlife Commission, Governor, and legislators) with predictions about the possible outcomes of public harvest seasons and the effects they would have on wolf population sizes to inform their decisions about overall population status and trends. As Montana’s wolf population fluctuates, FWP will continue to manage wolves with a primary objective of maintaining a healthy, sustainable population above federal ESA listing criteria (15 breeding pairs or 450 wolves). Further, this plan affords the commission the ability to direct local differences in the level of wolf harvest to reach specified population objectives, or other management objectives, at the statewide scale.

Montana’s landscape is extremely diverse, with a complex mix of differing prey bases, land ownership, land uses, social tolerance levels, and potential for conflict. Wolf presence is encouraged on large contiguous blocks of public land, managed primarily as backcountry areas or national parks where there is the least potential for conflict with livestock or big game hunting opportunities. Wolf packs in areas of mixed public and private lands will be managed similarly to that of other free-ranging wildlife in Montana and will depend on wolf population status, type and severity of conflict, land ownership, and social tolerance. While this plan will guide FWP management of wolves, some agency discretion and flexibility will be exercised to accommodate the unique attributes of each pack, its history, the site-specific characteristics of its home range, landowner preferences, or other factors that cannot be

reasonably predicted at this time. Management flexibility will be crucial in addressing all of the public interests that surround wolves.

### **Public harvest opportunities**

In Montana, the goal of wolf management is to balance wolf numbers and distribution within the constraints of the biological, social, and political landscapes. “Management” implies that FWP actively engages in activities which assure long-term population welfare and reduce the potential for conflict or resolve conflict where and when it develops. Agency actions are selected from a spectrum of possibilities and are aimed at matching the appropriate management tools to the situation. “Management” is not synonymous with lethal control. On the contrary, wolf population management includes the full range of tools from non-lethal to lethal and incorporates other agency functions such as public outreach, conservation education, law enforcement, and landowner relations. Wolves do not exist in isolation from their environment, nor should an effective management program isolate wolves from their environment. Management actions are evaluated in light of prevailing conditions or extenuating circumstances. Wolf populations fluctuate as a result of management actions, natural mortality, legal harvest, illegal take, wolf productivity, and ungulate population fluctuations.

Over time, harvest rules, regulations, and hunting and trapping boundaries have changed based on wolf population status, sociopolitical tolerance, and direction from the commission and or the legislature. The 2007 Legislature created a wolf hunting license for residents and nonresidents (Senate Bill 372). The first season in 2009 had a quota of 75 distributed among 3 wolf management units. At the start of FWP’s regular wolf harvest season in 2011, a statewide wolf quota of 220 was established and partitioned into fourteen individual wolf management units (WMUs). From 2009–2012, season lengths were gradually extended. In 2012 and 2013, bag limits were increased to 3 and 5 wolves, respectively. A quota was retained in WMU 110 from 2012–2020. Quotas in WMU 313/316 (separation or consolidation differed by year, WMU 313 was established in 2013) persisted from 2012–2022, with no quotas in these WMUs in 2021. Since 2021, the number of wolf hunting licenses allowed for an individual and the number of wolves allowed to be legally harvested with one trapping license have both increased to 10 each, and scale of management transitioned from WMUs (except WMU 313, which has remained despite the transitions) to Trapping Districts to regions. Quotas may differ by regions and WMUs depending on wolf distribution, biological and sociopolitical environments, and or specific objectives. In the future, more specifically defined areas with associated quotas (i.e., zones with under-objective ungulate populations or WMUs around national parks) may be considered.

Since the congressional delisting of wolves in 2011 (and briefly in 2009), FWP has developed and implemented wolf harvest strategies that maintain a recovered and connected wolf population, reduce wolf-livestock conflicts, reduce wolf impacts on low or declining ungulate populations and ungulate hunting opportunities, and effectively communicates to all affected parties the relevance and credibility of the harvest while acknowledging the diversity of values among those parties. Wolf harvest (i.e., season dates, boundaries of units, bag limits, quotas, allowed tools and equipment) is currently reviewed annually due to public interest and its controversial nature, and while unlikely and not anticipated, this frequency may change. The legislature creates and adopts statutes that govern management of wildlife, and it is FWP’s responsibility to implement those statutes, regardless of the agency’s stance, data or science, and personal beliefs (see Appendix B). If, by chance, the legislature changes statutes or new statutes are added, regarding gray wolf management, FWP is required to implement wolf management within the scope of those changes. Annual changes to the wolf harvest seasons and associated hunting and trapping regulations are established in the season-setting process under commission authority and described in the annual “Wolf, Furbearer, and Trapping - Montana FWP

Trapping and Hunting Regulations” (<https://fwp.mt.gov/hunt/regulations/wolf>). If the USFWS relisted wolves under the ESA, the USFWS would become the ultimate authority on wolf management and public wolf harvest would likely cease.

Several changes to wolf harvest season resulted from the 2021 Montana Legislative Session. Specifically, the legislature mandated the commission to establish “hunting and trapping seasons for wolves with the intent to reduce the wolf population in this state to a sustainable level, but not less than the number of wolves necessary to support at least 15 breeding pairs.” § 87-1-901, MCA. The purpose of the change was to increase individual harvest opportunity, balance ecological and sociopolitical needs and tolerance, and ensure the maintenance of a healthy wolf population in compliance with federal recovery mandates. Because the wolf population is considerably greater than the federal recovery threshold, there remains a great deal of flexibility to both reduce the wolf population and still maintain a sustainable population. Three sections of the MCA are of significance to recent changes in wolf harvest and season structure that provide the tools that may be used to achieve the population reduction. As a result of House Bill 225 (67th Montana Legislature), § 87-1-304, MCA, provides the commission with the authority to initiate a wolf trapping season that begins the first Monday after Thanksgiving and closes on March 15, while also providing the commission with the latitude to adjust the start of the trapping season for specific wolf management units based on regional recommendations. As a result of House Bill 224 and Senate Bill 314 (67th Montana Legislature), § 87-1-901, MCA, states that trapping seasons must allow for use of snares by holders of a trapping license, mandates the commission to reduce Montana’s wolf population to a lower, sustainable level, but no lower than the number of wolves needed to maintain 15 breeding pairs, and provides the commission with the authority to apply different management techniques depending on conditions in each administrative region. Some of these techniques include allowing unlimited take of wolves on a single wolf hunting or trapping license, allowing use of bait while hunting or trapping wolves, and allowing hunting of wolves on private lands outside daylight hours with use of artificial light or night vision scopes. Section 87-6-214, MCA, as a result of Senate Bill 267 (67th Montana Legislature), allows for reimbursement of costs incurred related to the hunting or trapping of wolves for individuals licensed to hunt or trap wolves.

Since 2012, the average annual harvest by license year, while both hunting and trapping have been legal, is 256 wolves. Wolf harvest (Figure 9) and harvest rate (Figure 10) has been stable in recent years and has never exceeded 30%. The number of active wolf hunters ranged from 7,457–15,570 and hunter days ranged from 85,882–228,181 (Figure 11). The number of active trappers ranged from 228–572, wolf trapper days ranged from 7,524–21,653, traps set ranged from 2,340–4,528 and trap days ranged from 59,062–174,135 (Figure 12). Legal harvest is the leading cause of mortality for wolves in Montana, followed by agency control efforts (see subsequent section). Other causes of mortality (e.g., § 87-1-901, MCA, [SB200] which allows private landowners to shoot threatening wolves, vehicle collisions, and illegal take) are negligible to minimal compared to wolf population size at present (Figure 13).

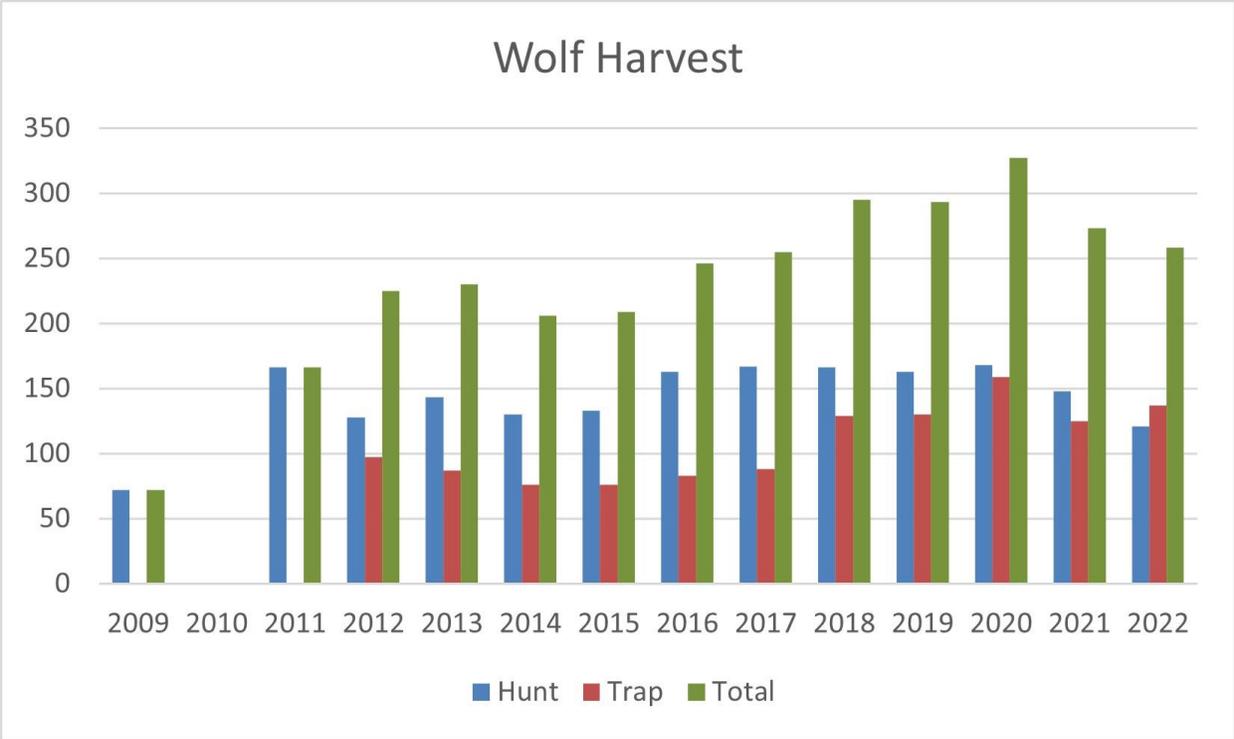


Figure 9. Number of wolves harvested in Montana by license year, separated by hunting and trapping, 2009—2022. Values drop to 0 in 2010 because wolves were briefly relisted on the ESA (Parks et al. 2023).

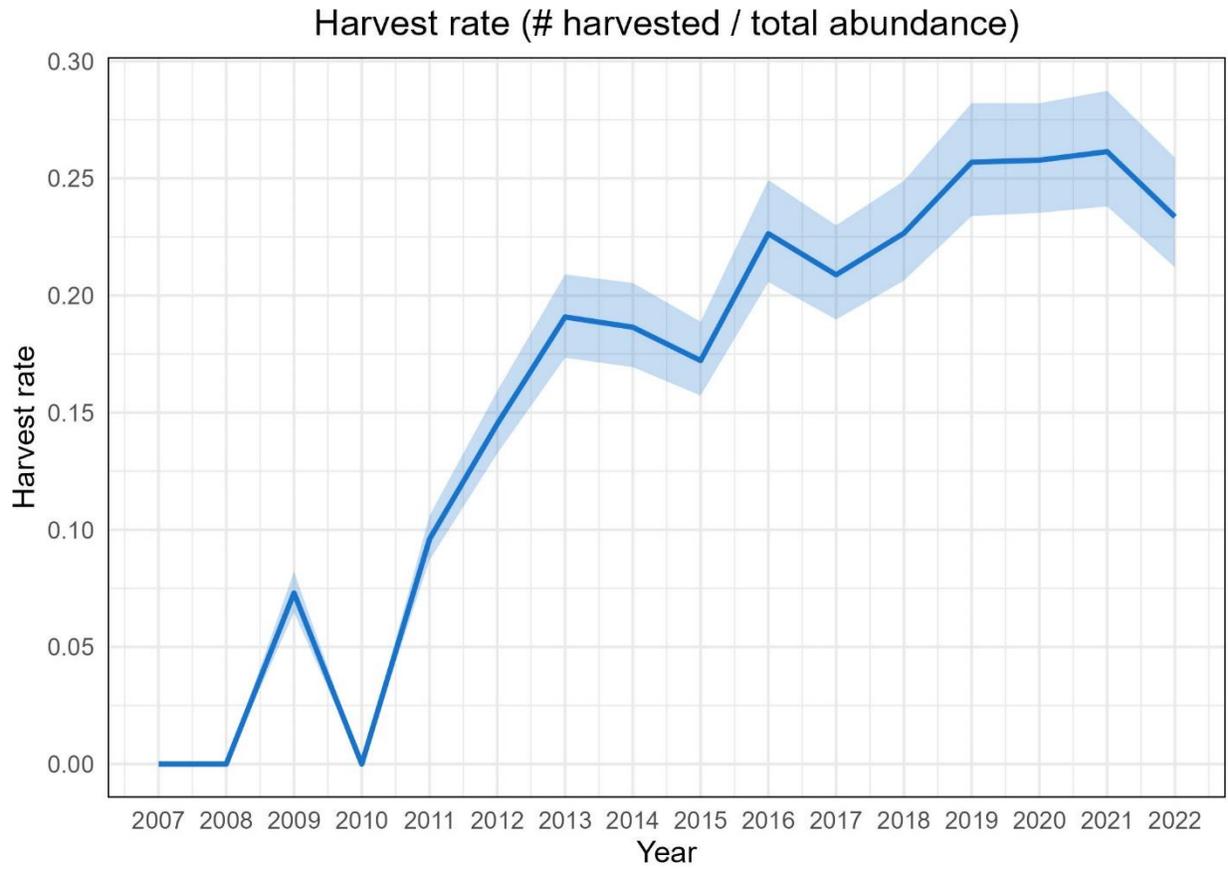


Figure 10. Harvest rate (number harvested / total abundance) of wolves in Montana by calendar year following the population estimate, 2007—2022 (Parks et al. 2023).

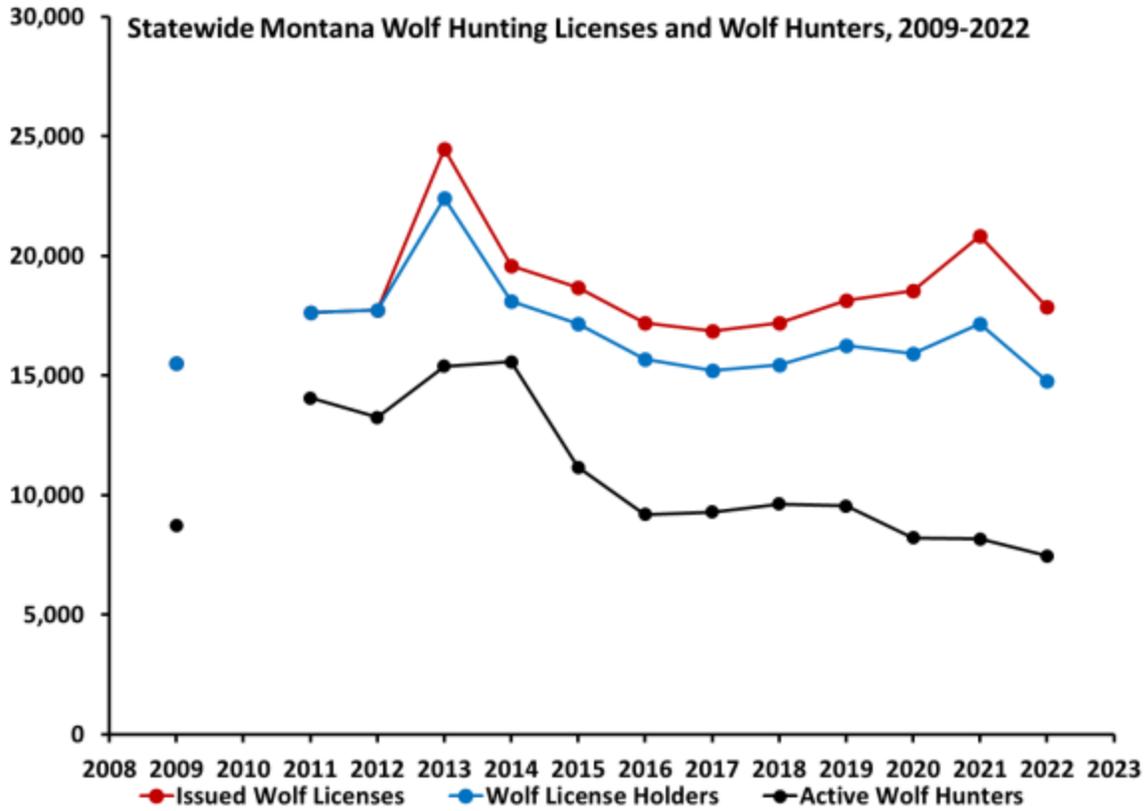


Figure 11. Number of wolf hunting licenses issued, number of hunters issued  $\geq 1$  wolf hunting license, and number of active wolf hunters estimated from Hunter Surveys in Montana, 2009–2022 (Parks et al. 2023).

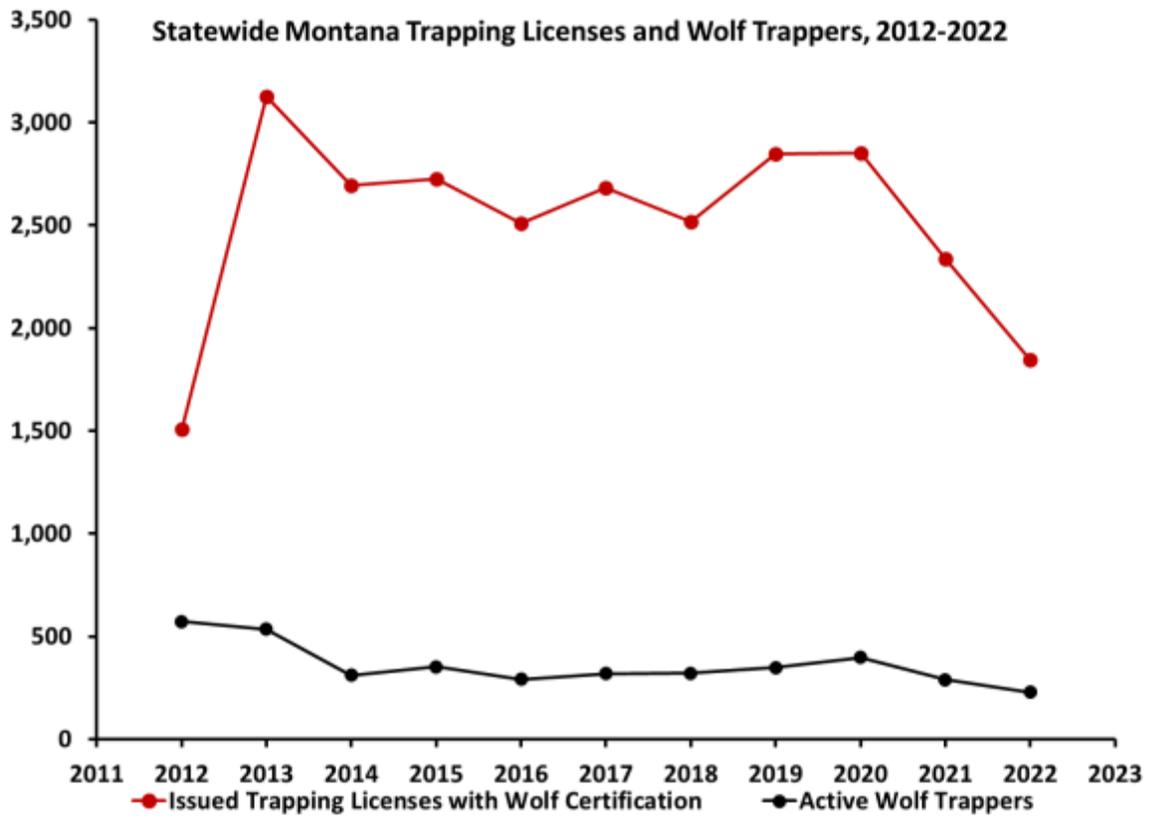


Figure 12. Number of trapping licenses issued to trappers with wolf trapping certification and number of active wolf trappers estimated from Harvest Surveys in Montana, 2012–2022 (Parks et al. 2023).

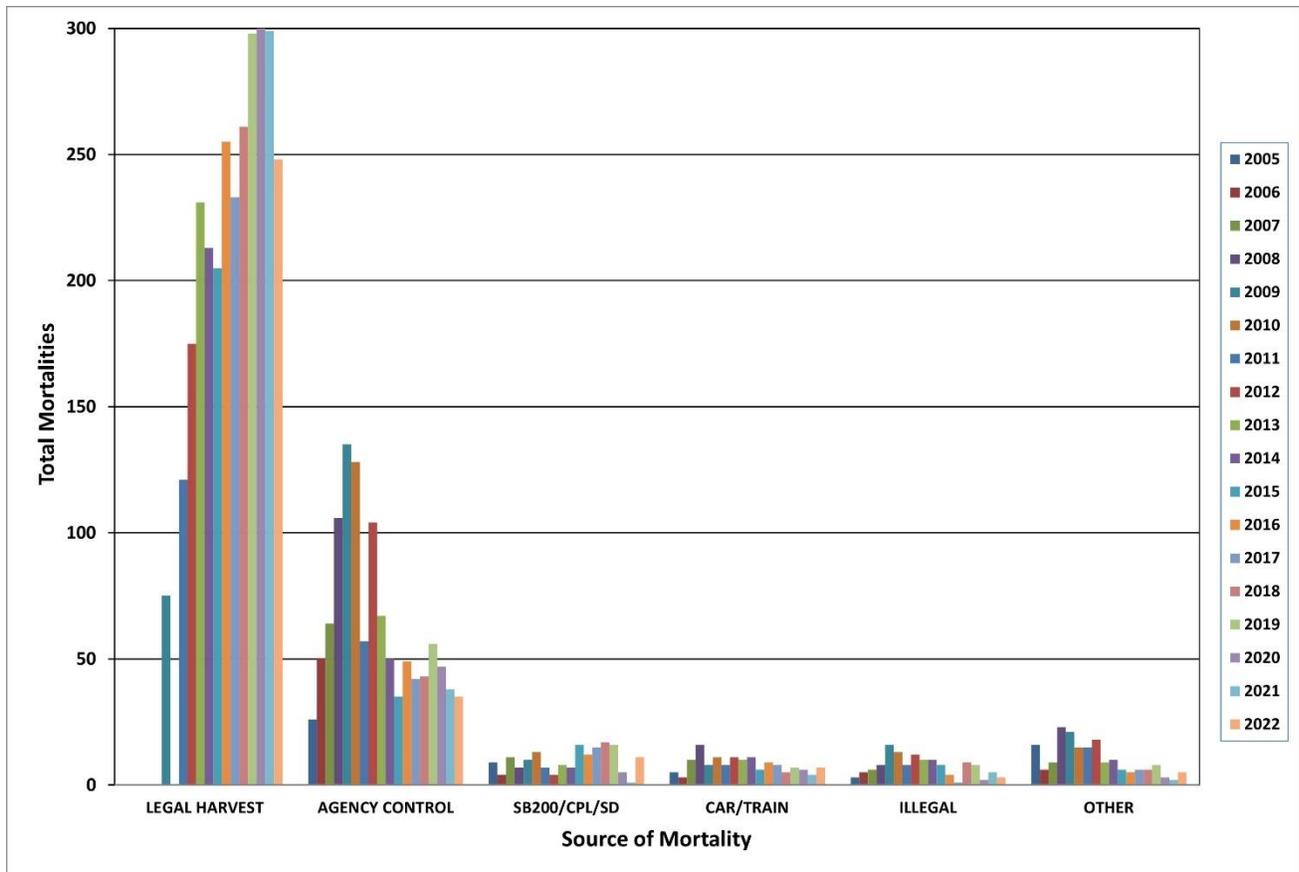


Figure 13. Documented wolf mortalities by cause by calendar year (2005–2022). The third category from the left refers to SB200, citizens protecting livestock, and self-defense (Parks et al. 2023).

From 2012–2017, FWP documented 349 incidental non-target captures, 55% of which survived. Only 10% of these non-target captures were in traps intended for wolves. Seventy-three percent of the incidental captures in wolf sets were released, and 27% died. Species that died or were euthanized included 2 bobcats, 1 deer, and 4 mountain lions. Species released from wolf traps included 1 deer, 1 elk, 8 domestic dogs, 1 grizzly bear, 1 lynx, and 7 mountain lions (Inman 2018). From 2018–2022, FWP documented 310 incidental non-target captures, 67% of which survived. Twenty-four percent of these non-target captures were in traps intended for wolves. Seventy-four percent of non-target captures in wolf sets were released and 26% died. Ninety percent of the non-target captures in wolf sets were in footholds and 10% were in snares. Species that died or were euthanized included 1 bobcat, 5 deer, and 10 mountain lions. Species released from wolf traps included 28 domestic dogs, 12 mountain lions, 4 moose, 3 deer, 3 wolverines, and 2 black bears (Kluge 2023). Incidentally captured dogs were either running at large or out of sight or command (i.e., beyond regulatory set-back distance of 50 ft. from road or trail).

Harvest management will proceed flexibly, but all hunting and trapping would likely be restricted if the statewide wolf population approaches 15 breeding pairs or 450 wolves. As the wolf population fluctuates, FWP will continually assess population status and analyze and adjust harvest management strategies. After wolf harvest seasons began in Montana, FWP determined the amount of human-caused mortality has not negatively influenced the probability a pack will contain a successful breeding pair, despite the lack of significance of the relationship which was likely influenced by the difficulty of

identifying breeding pairs (Figure 14). However, if human-caused mortality reaches a level that significantly reduces the population size and the ability to maintain 15 breeding pairs or 450 individuals, the harvest strategy would be reevaluated. This plan is not prescriptive and does not specify more precise population targets beyond those levels set forth in § 87-1-901, MCA, which are subject to change via future legislation, nor at what point more conservative regulations will be enacted or more liberal regulations restricted. These decisions and the associated risk-tolerance are under the purview of the elected or appointed public trustees, including the FWP Director, the Governor, the commission, and the legislature. FWP season proposals will ultimately be decided on by the commission, including decisions about season types and the associated risk tolerance under delegated authority from the legislature, unless or until new laws passed by the legislature further define the parameters of commission decision making authority. All these decisions and processes will be informed by the latest science and information. However, the policy direction, regulations, and, ultimately, the wolf population are likely to fluctuate through time as elected and appointed trustees change. At their discretion, the commission may use FWP recommendations and wolf season options to guide harvest structure based on population trends.

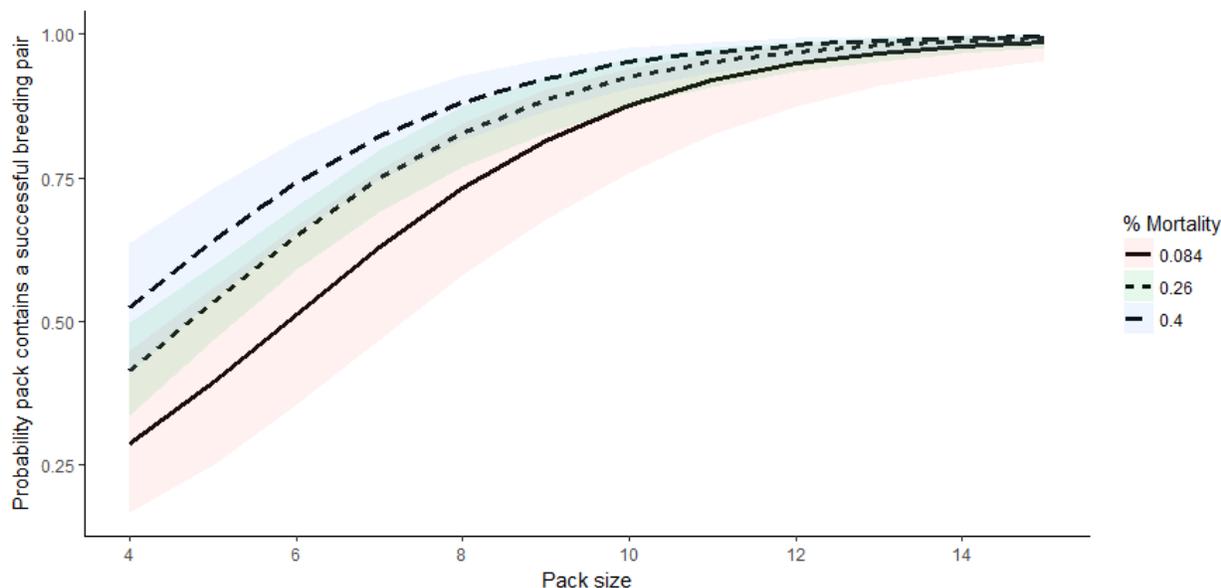


Figure 14. Probability a pack contains a successful breeding pair against pack size with the minimum, mean, and maximum % human-caused mortality at the population level and the average population growth rate for wolves in Montana during the delisted period (2009, 2011–2016; FWP 2018).

Strategies FWP will use to increase take opportunity with the goal of reducing wolf population abundance include, but are not limited to:

- Season extensions or timing of the season;
- Increase or removal of quotas;
- Increase in bag limits (i.e., number of wolf hunting and trapping licenses per individual);
- Implementation of additional equipment (e.g., electronic calls [House Bill 73 (63rd Montana Legislature)]); and
- Allowance of tools to facilitate harvest (e.g., bait, night-hunting).

Alternatively, other strategies to decrease wolf harvest may be used to alleviate sociopolitical concerns or to reduce additional stressors on the wolf population. Strategies FWP will use to decrease take opportunity with the goal of increasing wolf population abundance include, but are not limited to: Shortened seasons or timing of the season;

- Decrease of quotas;
- Decrease in bag limits;
- Restrictions on use of certain equipment;
- Limits on methods of take; and
- Mitigate for public safety concerns (e.g., setback distances) or take of recovering species (e.g., foothold sizes or floating season dates).

Quotas are established to provide harvest opportunity with an upper limit on harvest allowed and designed with historical harvest rates and population numbers in mind. More specifically, wolf quotas prevent overharvesting the population, which would thereby threaten viability and longevity, to the point where management authority of the state is jeopardized. Similarly, regions and WMU boundaries may be modified (i.e., by ecoregion, geography, or based on pack distributions), or a permit system (i.e., lottery) may be developed to further restrict wolf harvest and more appropriately manage the wolf population based on biological and sociopolitical contexts. After considering population densities, recruitment estimates, and total harvest each year, change in estimated population size has never exceeded  $\pm 15\%$  from the previous year. Established wolf populations can withstand human-caused mortality rates ranging from 15–48% of the mid-winter population (Keith 1983, Fuller 1989, Fuller et al. 2003, Adams et al. 2010, Creel and Rotella 2010, Gude et al. 2012). Through modeling exercises, FWP has estimated that a reduction in population growth rate and abundances will occur when harvest is  $>25\text{--}30\%$  of the previous year population estimate (Figure 15; Messmer 2021 and Godar et al. 2023). If a statewide quota of 450–700 individuals is consistently harvested over a 5-year period, and human-caused mortality levels remained stable on a declining wolf population, the wolf population size would approach levels that could not support 15 breeding pairs and the possibility of extirpation is present (Figure 16; Messmer 2021 and Godar et al. 2023). These scenarios do not represent harvest prescriptions or predictions of what the future harvest will be; rather they are intended to represent the possible consequences of varying levels of sustained harvest and increases that may result from more liberal regulations enacted by the commission. If any of the elevated human-caused mortality levels could be achieved, harvest levels would likely need to be reduced after 1-3 years to prevent the population from decreasing below the level needed to support 15 breeding pairs, as set in state and federal law. As a result, if liberalized harvest is determined to pose a risk to long-term population persistence, then FWP's recommendation to the commission will be a shift to be more conservative. Liberal harvest is meant to reduce population size and restrictive harvest is intended to maintain or increase population size, however these efforts may not have the intended results. FWP recommendations for harvest strategies are based on wolf population estimates, trends, as well as hunter and trapper success rates. Harvest regulations are decided and adopted as laws by the commission. The commission has discretion and ultimate decision-making authority.

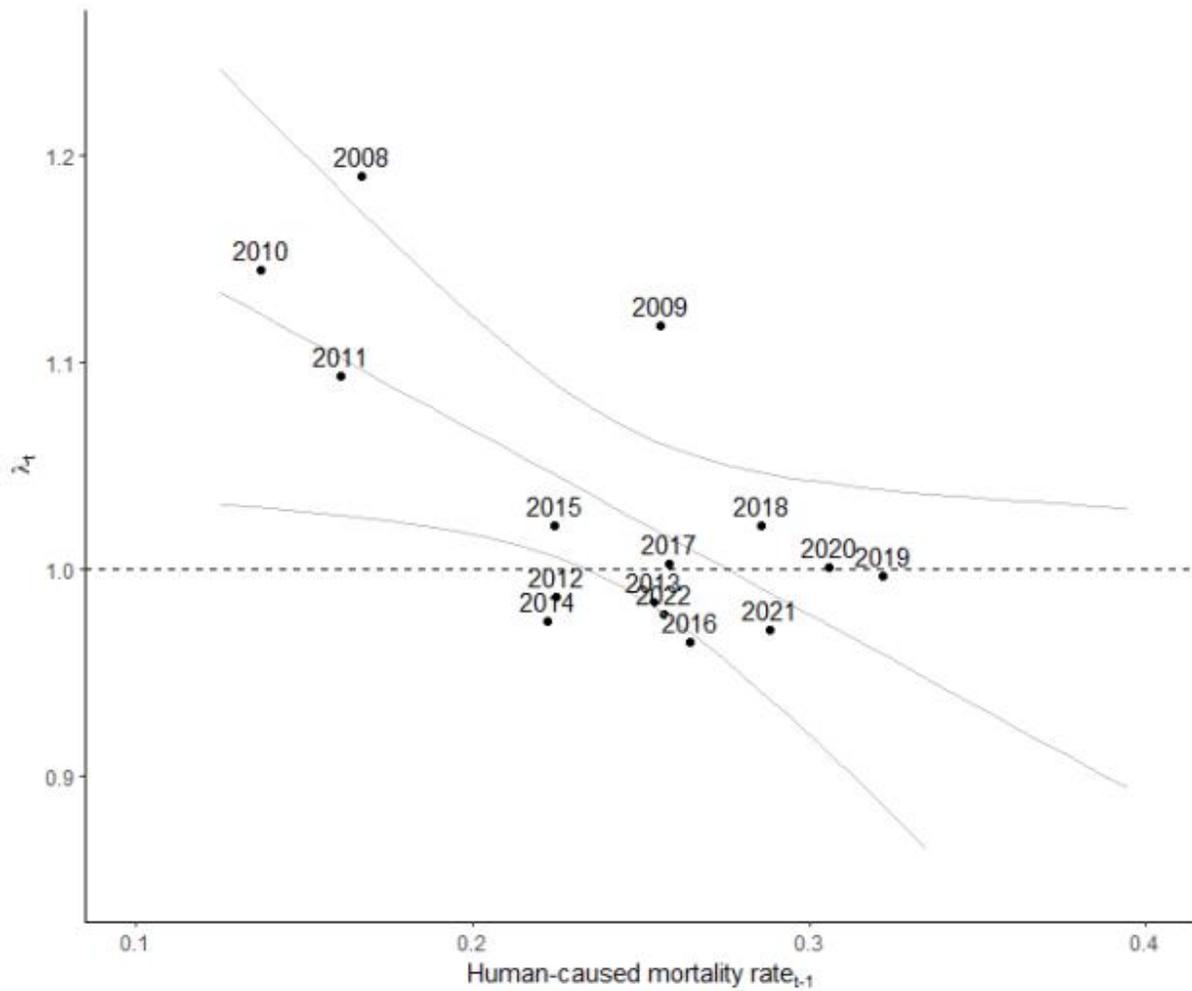


Figure 15. Estimated linear relationship and 90% credible intervals (grey lines) between annual population growth rate ( $\lambda_t$ ) and human-caused mortality rate (human-caused mortalities<sub>t</sub> / iPOM wolves<sub>t-1</sub>). The human-caused mortality rate resulting in an expected stable population ( $\lambda = 1$ ) is about 27.5% (Godar et al. 2023).

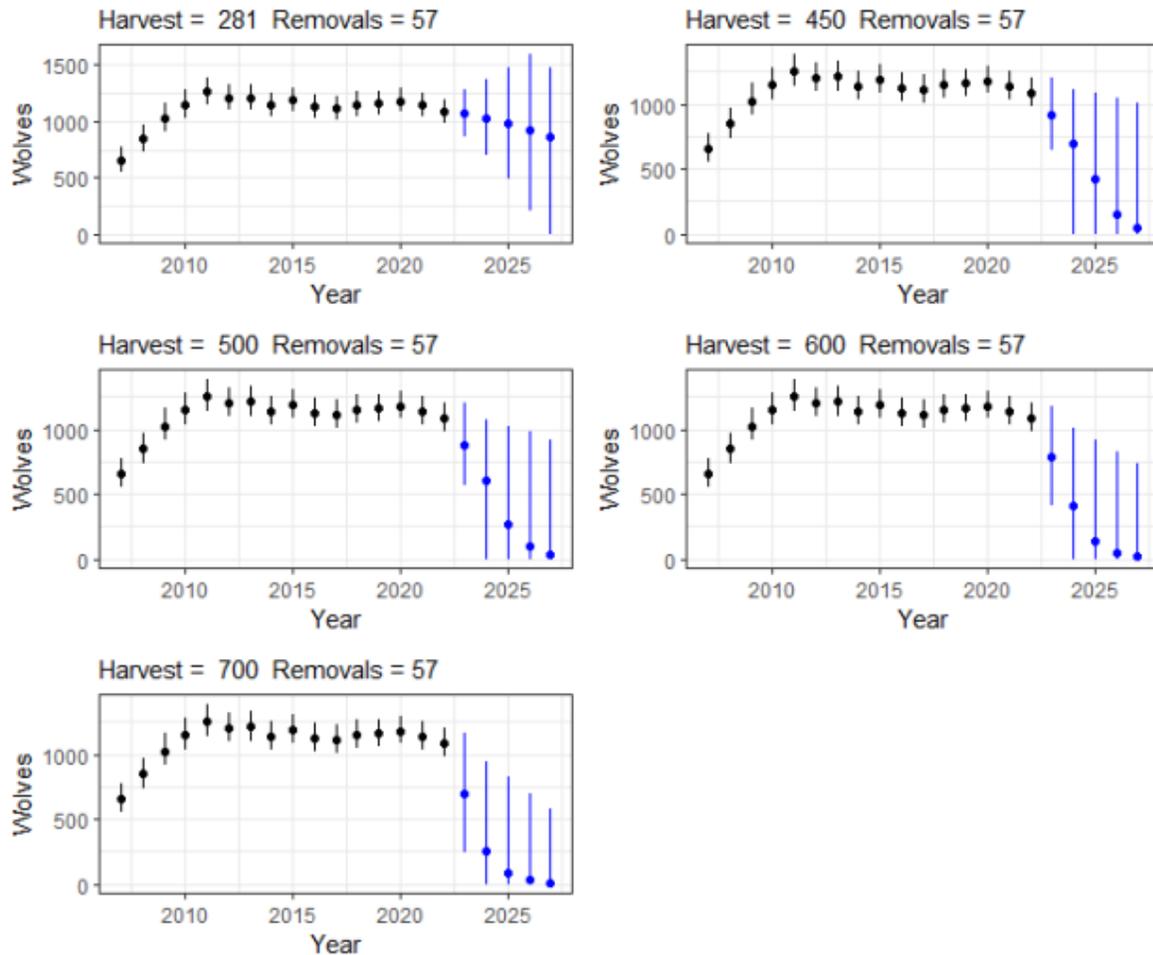


Figure 16. Wolf population model predictions under FWP commission requested human-caused harvest and removal scenarios. The ‘Harvest=281’ scenario represents the recent 5-year mean hunting and trapping harvest from 2018-2022. Black points and error bars are iPOM estimates with 95% credible intervals; blue points and error bars are simulation results for future years with 90% prediction intervals. Panel titles reflect the human-caused mortality scenario each year into the future (Godar et al. 2023).

Additional mechanisms may be used to regulate take and minimize incidental captures. This includes rigorous tracking of harvest in each region and WMU through mandatory harvest reporting and a 24-hour closure notice process. If wolf harvest exceeds a designated quota, the region or WMU is closed for the season. The commission also adopted a set of regulatory components to reduce human safety concerns, reduce risk of overharvest, and reduce probability for take of federally protected lynx and grizzly bears. These mechanisms have been put in place to ensure harvest does not exceed acceptable limits and that there is no risk to the wolf population that would place it in need of ESA recovery, or to other species as a result of the wolf regulations. Similarly, wolf regulations should not impact other federally listed species or the ability to delist or keep delisted those species. For example, the commission restricted wolf trapping in occupied grizzly bear habitat by adopting a floating open season date. Wolf trapping in occupied grizzly habitat will open December 31st unless otherwise determined by FWP due to evidence the majority of grizzly bears in these areas have begun hibernation, as a means to avoid incidental take (i.e., floating season start date). Under current Commission adopted regulations, non-target capture of a single grizzly bear or lynx would initiate a commission review of the current

harvest structure with potential for rapid in-season adjustments to hunting and trapping regulations. Additionally, the commission can adjust seasons annually, regionally, and on short notice to address harvest rate and population trajectory or concerns to species like lynx or grizzly bears.

Harvest regulations are presented as formal recommendations, and FWP solicits public comment on such proposals. Following public comment, a final recommendation is forwarded to the commission for their consideration. Through annual commission oversight and public input, hunting and trapping take place under designated seasons and regulations which describe legal means of take, license requirements, and reporting and tagging requirements. This process is similar to that of all other game or furbearing species. Regulated hunting and trapping of wolves will take place within the larger context of multi-species management programs, rather than the context of single species management. Specific harvest objectives depend on regional densities, distributions, trends, and sociopolitical environment. Wolves could be promoted (on remote public lands) or discouraged (in areas with high livestock densities) depending on harvest objectives, district boundaries, and pack distribution. Harvest of wolves is not permitted in National Parks. Tribal government maintain wildlife management authority on their respective Native American Reservation. Some tribal governments implement a wolf season.

The FWP Law Enforcement Division enforces harvest regulations and rules, along with other Montana statutes related to wildlife and human safety. FWP enforcement personnel coordinate with federal, state, local, and or tribal authorities as necessary. Game wardens will proceed similar to other managed game and furbearing species, with penalties for violations and restitution values established in Montana statute. Wanton waste rules (§ 87-6-205, MCA) do not apply to wolves; however, if a hunter or trapper wants to retain possession of the hide or skull, it must be presented to FWP within 10 days after harvest for the purpose of tagging the hide prior to transfer of possession (§ 87-6-411, MCA). If any part of the animal moves across state lines, a Convention on International Trade in Endangered Species (CITES) tag is required (and often required by taxidermists and tanneries; 50 CFR 23.69(b)(3)). The US Dept. of Interior and the USFWS have found that the State of Montana has specific measures to control wolf harvest, and the export of wolves legally taken during harvest seasons will not be detrimental to the survival of the species (FWS/DMA/CEP 1-07). FWP has a 1-800-telephone hotline (TIP-MONT) to receive anonymous reports of observed or suspected violations of laws. This is an important tool for game wardens to receive information and respond to public requests for assistance or of concern, including possible illegal activity concerning wolves. After an investigation, violations of the statutes, rules, or regulations are prosecuted in cooperation with the county or district attorney for state or federal cases, respectively. In cooperation with the Courts of Limited Jurisdiction, penalties and restitution are established for unlawful takings and rule violations. Montana's penalties are commensurate with other wildlife species to discourage criminal activity, particularly repeat offenses. Game wardens and or biologists work with landowners to address their concerns, handling or referring livestock damage calls, responding to wolf sightings and perceived threats to public safety, addressing hunter concerns and complaints associated with wolves, and responding to reports of injured or road-killed wolves.

Possessing parts of animals that died illegally or of unnatural causes (including those from conflict-based, protection of property, or self-defense events) is not permitted. The entire carcass of wolves killed by private individuals in defense of life or property will be returned to FWP and remain state property, regardless of whether the incident occurred on public or private lands. Upon confiscation, carcasses resulting from illegal killings also remain the property of FWP. If the hide, bones, and or skull are in good condition, they can be salvaged and used for research, tribal cultural use, and educational purposes. These specimens may be transferred to other government agencies, non-profit organizations,

tribal authorities, or educational institutions for general public benefit. Parts unsuitable for these uses are destroyed.

#### **Other considerations**

*Same as the No Action Alternative.*

#### **FWP staff and locations**

*Same as the No Action Alternative.*

#### **Wolf-livestock conflicts**

Addressing wolf-livestock conflicts entails two separate, but parallel elements; management and compensation. Management activities are primarily conducted by state and federal agencies working in tandem with landowners and livestock producers and aim to reduce the potential for wolf-livestock conflicts and to resolve the conflicts where and when they develop. Examples include providing technical assistance to producers, investigating complaints, and implementing conflict prevention measures (lethal and non-lethal strategies) that reduce the probability of a new or chronic depredation incident. These management programs are funded, administered, and implemented by FWP and WS, though many non-governmental organizations (NGOs) also have programs and work closely with landowners to prevent wolf-livestock conflict. The second element, compensation, addresses the economic losses when livestock are killed or injured by wolves or assist in funding prevention measures. This element is funded, administered, and implemented by the Montana Livestock Loss Board. Program funding for the Livestock Loss Reduction and Mitigation Program is primarily from appropriations made by the Montana legislature (§ 17-2-102, MCA). These two elements (management and compensation), are funded, administered, and implemented separately and independently of one another, although parallel and united in the goal of maintaining a viable wolf population and addressing wolf-livestock conflicts.

In Montana, wolves routinely encounter livestock on both private and public land, but most depredations occur on private land (83% in 2005–2015; DeCesare et al. 2018). Wolves are opportunistic predators, most often seeking wild prey. However, some individual wolves and packs learn to prey on livestock which can be difficult to stop if the whole pack is involved (Harper et al. 2005). Once a pack has learned to kill livestock, the probability of depredation recurrence is high without intervention (Bradley et al. 2015). Because livestock depredation is a learned behavior, preventive methods may be most effective when employed proactively before a depredation occurs. Wolf depredations on private land are more likely to occur where natural prey is present, if pastures are larger in size, if there is a greater abundance of cattle, and if cattle graze farther from human-developed areas (Mech et al. 2000, Bradley and Pletscher 2010). To address wolf-livestock conflicts, FWP uses an integrated program of non-lethal and lethal conflict management tools (Bangs et al. 2006, Gese et al. 2021), and actively partners on non-lethal proactive conflict mitigation projects across the state (Wilson et al. 2017). For wolves, harvest and lethal removal following conflicts are important management tools, although neither are enough to completely resolve or prevent future conflicts (Bradley et al. 2015, DeCesare et al. 2018). The intent of non-lethal methods is to prevent or resolve a wolf conflict without killing the wolf or wolves in question but may sometimes be used in conjunction with lethal methods. There are a variety of non-lethal tools and many have proven successful in certain contexts (Moreira-Arce et al. 2018, Bruns et al. 2020), such as when applied conditionally (e.g., based on terrain, proximity to den or rendezvous sites, avoiding overexposure to techniques that would result in habituation; Stone et al. 2017). In Montana, as of 2015, the percentage of livestock operations using non-lethal methods to control predators was 14.5% (USDA 2015). Strategies to mitigate wolf-livestock conflicts include:

- Carcass pickup and composting programs—removing attractants from wintering and birthing pastures or near water and bedding areas in open pastures. Physical removal or composting can be difficult due to terrain or carcass conditions. These measures must also comply with other land-use policies (e.g., USFS and Department of Agriculture regulation) and may not be allowed in certain situations. This strategy prevents wolves from getting accustomed to easily attained food.
- Penning and fencing livestock—keeping livestock in proximity to human structures and best used for small pastures, small herds, or when stock is gathered in a reasonably protected area.
- Fladry—flagging (can be electrified) on fencing as a visual deterrent (Musiani et al. 2003, Davidson-Nelson and Gehring 2010). Best used as mobile protection on a short-term basis for effective use as it requires regular maintenance and wolves may become habituated.
- Livestock guard dogs to accompany and protect livestock (Gehring et al. 2010, Urbigit and Urbigit 2010, Kinka et al. 2021). This strategy depends on the level of wolf activity in the area, size of grazing area, and behavioral characteristics of the dogs. Some guarding breeds used in the United States were selected decades ago to protect livestock from coyote predation and may not be as successful at protecting livestock from wolves. Other aggressive breeds of animals (e.g., donkeys, llamas) may help protect against wolves but should be considered experimental. Livestock guard dogs may be at risk of injury or death as they are viewed as a threat to wolves, and may not be effective at repelling wolves away. Thereby, this strategy is most effective in combination with increased human presence.
- Range rider programs involve regular and planned patrol and monitoring of livestock and surrounding landscapes to document and or deter wolf activity to minimize wolf-livestock interactions (Parks and Messmer 2016, Wilson et al. 2017). This is most effective when wolves are most active (dusk to dawn), during a birthing pulse, and when range riders are equipped with hazing tools. Similarly, herders can be employed for sheep operations. In general, this increased human presence requires flexibility, a significant amount of time, and depending on the size and distribution of the livestock operation(s), several personnel.
- Use of light and sound devices as visual and auditory deterrents—best used in small pastures and requires frequent position changes for effective use as wolves may become habituated.
- Hazing—can be non-injurious (e.g., firing blanks from a gun) or non-lethal injurious (e.g., pursuit, rubber bullets, paintball gun, bear spray) harassment.
- Husbandry changes to avoid wolf-livestock interactions and reduce vulnerability. This includes use of alternative grazing routes or fields, night feeding to encourage congregation, calving season changes (i.e., earlier so that young are larger when moved to open pastures) and control (i.e., managing the herd to calve in the same short period of time), changing herd structure (i.e., adults with young) and timing of rotation into forested areas (i.e., after the birthing pulse of wild ungulates). Livestock handling is stressful to the animals, and may lead to poor animal health, less efficient movement, and creates noise, thereby perhaps providing an attractant to wolves.
- Other experimental practices such as bio-fencing, belling cattle, using wolf-savvy cattle, may be effective non-lethal strategies, but their outcomes are still not yet known.

FWP will work cooperatively with livestock producers, NGOs, and WS to reduce risk of wolf-livestock conflicts by implementing these tools when deemed appropriate. FWP will actively engage by sharing information, technical expertise, equipment, materials, and hands-on field assistance. Furthermore, FWP will continue to collaborate on research designed to improve our understanding of current and developing proactive non-lethal tools. With increasing need for funding and technical assistance to make

proactive conflict prevention tools available to livestock producers, FWP will encourage coordination of all stakeholders striving to reduce wolf-livestock conflicts and support working lands and wildlife.

Individual livestock producers are encouraged to take voluntary measures to reduce the potential for wolf-livestock conflict. Examples include reducing conflict availability by altering turnout dates, type of livestock, or the timing of breeding and calving cycles. If problems are chronic, a livestock producer might have the option to move or receive payment from a private organization for retiring a public grazing allotment, with agreement from the land management agency. Federal land management agencies do not have administrative or budgetary procedures to pay a producer to retire an allotment. Such funds must be secured from other sources. However, the federal land management agencies do have administrative flexibility to address chronic wolf-livestock conflicts by working with individual producers or grazing cooperatives to modify grazing practices to the mutual agreement and benefit of all interests. Producers should also be rewarded for their willingness to cooperate in experimental protocols testing non-lethal management tools, such as scaring devices or noise-makers. Because wolves learn quickly and may habituate to certain management tools, no single non-lethal technique will work in all situations or for extended periods of time. The National Wildlife Research Center (the research arm of WS), in conjunction with other partners, has been actively developing and field-testing methods to discourage wolves from approaching livestock.

More research evaluating the effectiveness of non-lethal tools for carnivore-livestock conflict is warranted (Kinka et al. 2021). As part of a Conservation Innovation Grant (CIG), awarded to Heart of the Rockies Initiative and carried out by non-FWP project staff referred to as the Conflict on Working Lands CIG Team, research pertaining to conflict prevention strategies has been initiated. The objective of this research is to address key questions to provide the Natural Resources Conservation Service (NRCS) with information to add or modify existing “Conservation Practices” that would provide cost-sharing opportunities to ranchers to fund non-lethal strategies that reduce conflict. Specifically, this research will determine the effectiveness of three non-lethal tools with the most potential and greatest need for further testing; range riding, carcass management, and fencing. The intent with this research is to assist livestock producers in finding more effective ways for living with large carnivores and to do so by integrating ranchers into the research process (i.e., study design and implementation). This project is part of an initiative involving 7 western states and 11 landowner collaboratives representing more than 600 producers with the purpose of developing recommendations for NRCS and landowners to create templates and potential for long-term funding to support these preventative methods via the Farm Bill. Not only will this highly collaborative effort harbor a strong partnership in applied research and adaptive management with FWP, WS, and several NGOs and universities, but it will also increase the probability of finding solutions for proactive techniques that add value to agricultural operations and improve habitat for wide ranging species like grizzly bears and wolves. FWP will continue to conduct research and partner with external researchers to develop and evaluate methods for wolf-livestock conflict prevention.

Non-lethal management strategies are actively promoted to prevent conflict (Bangs et al. 2006), but over time or in certain situations, lethal measures may be necessary. FWP will consider non-lethal management techniques if the wolf population is declining and approaching 15 breeding pairs or 450 wolves. However, even when livestock producers regularly use non-lethal strategies, they are not always enough to effectively prevent all conflicts. All management strategies (lethal and non-lethal) employed require time, financial, and personnel costs to the livestock producer as well as to state and federal agencies. The use of some non-lethal strategies to prevent predator conflicts (from equipment to increased human-hours) are about 10 times more costly than lethal strategies (USDA 2015). As a result,

livestock producers may employ certain non-lethal preventative strategies (e.g., modified husbandry practices) but not others (e.g., range riders) because it is simply too expensive.

Citizens that encounter a wolf should rely on non-lethal harassment, however citizens can always kill a wolf in self-defense. § 87-1-901, MCA, does “allow a landowner or the landowner's agent to take a wolf on the landowner's property at any time without the purchase of a Class E-1 or Class E-2 wolf license when the wolf is a potential threat to human safety, livestock, or dogs.” If a wolf is killed in defense of life or property, citizens should protect the scene and carcass from disturbance and report it to FWP as soon as possible, but within 72 hours. FWP or WS will conduct a field investigation. Anytime a wolf is killed in defense of life or property, the entire carcass must be returned to FWP.

Directed wolf removal can be an effective tool to reduce wolf-livestock conflicts, particularly when compared to no action (Harper et al. 2010). Rapid response time and larger numbers of wolves removed reduces the occurrence of subsequent livestock depredations (Bradley et al. 2015) and reduces risk to neighboring livestock in the same area (DeCesare et al. 2018). FWP does not translocate wolves to reduce wolf-livestock conflicts. The USFWS translocated wolves away from depredation sites in the 1990s when wolves were first recovering but translocated wolves in Montana had poor success at reestablishing and surviving, and often continued depredating (Bradley et al. 2005). In addition, now that wolf populations are recovered, there are no longer suitable release sites where other wolves do not exist. Wolf depredations on private land are more likely to occur where natural prey is present, if pastures are larger in size, if there is a greater abundance of cattle, and if cattle graze farther from human-developed areas (Mech et al. 2000, Bradley and Pletscher 2010). Wolf depredations in Montana tend to recur in the same areas through time, and these areas tend to have higher densities of wolves and livestock (DeCesare et al. 2018). The type of livestock (i.e., breeds), their inherent behaviors (e.g., grouping), and how livestock producers respond (i.e., reading their behaviors when on range) may lead to lower risk of depredation threats for certain herds. Additionally, a neighbor's land, wildlife, and livestock management strategies may influence what occurs to another's livestock herd and the most effective resolution options available to them. Financial losses may result directly from wolf depredation. Indirect costs may accumulate because of increased management activities or changes to agricultural operations.

The vast majority of livestock losses are non-predator related. In Montana, in 2015, non-predator causes accounted for 96% of all adult cattle deaths and 90% of all calf deaths (USDA 2015). Losses due to wolves may be disproportionate to one or a few livestock producers because of where a wolf pack territory is established relative to livestock distribution, type of stock, and or grazing practices such as turnout dates. Most cattle depredations occur during the spring or fall months while sheep depredations occur more sporadically throughout the year. Missing livestock cannot be confirmed as wolf depredations, and the cause of death for livestock can be difficult to determine. Even with a carcass, cause of death may still be inconclusive if scavengers have destroyed the evidence, two or more carnivore species capable of killing livestock visited the site, or the carcass was completely consumed. In addition to livestock mortalities, producers have reported injured and stressed livestock, reduced weight gains, decreased pregnancy rates, and other complications when wolves are present. Questions about unconfirmed losses, best livestock management practices, or indirect effects of wolves on livestock productivity warrant additional research.

From 1987 to 2006, wolves killed 230 cattle and 436 sheep, with a total of 254 wolves being removed (Sime et al. 2007). The number of depredation reports received since those years has declined from 233 in 2009 to about 100 or less from 2014–2022 (Figure 17). The general decrease in livestock depredations

since 2009 may be a result of several factors, including more aggressive and rapid wolf control in response to depredations (Bradley et al. 2015, DeCesare et al. 2018) or the proliferation of non-lethal depredation deterrents. Since 1997, about 53% of wolf depredation reports received by WS have been verified as wolf-caused (Figure 18).

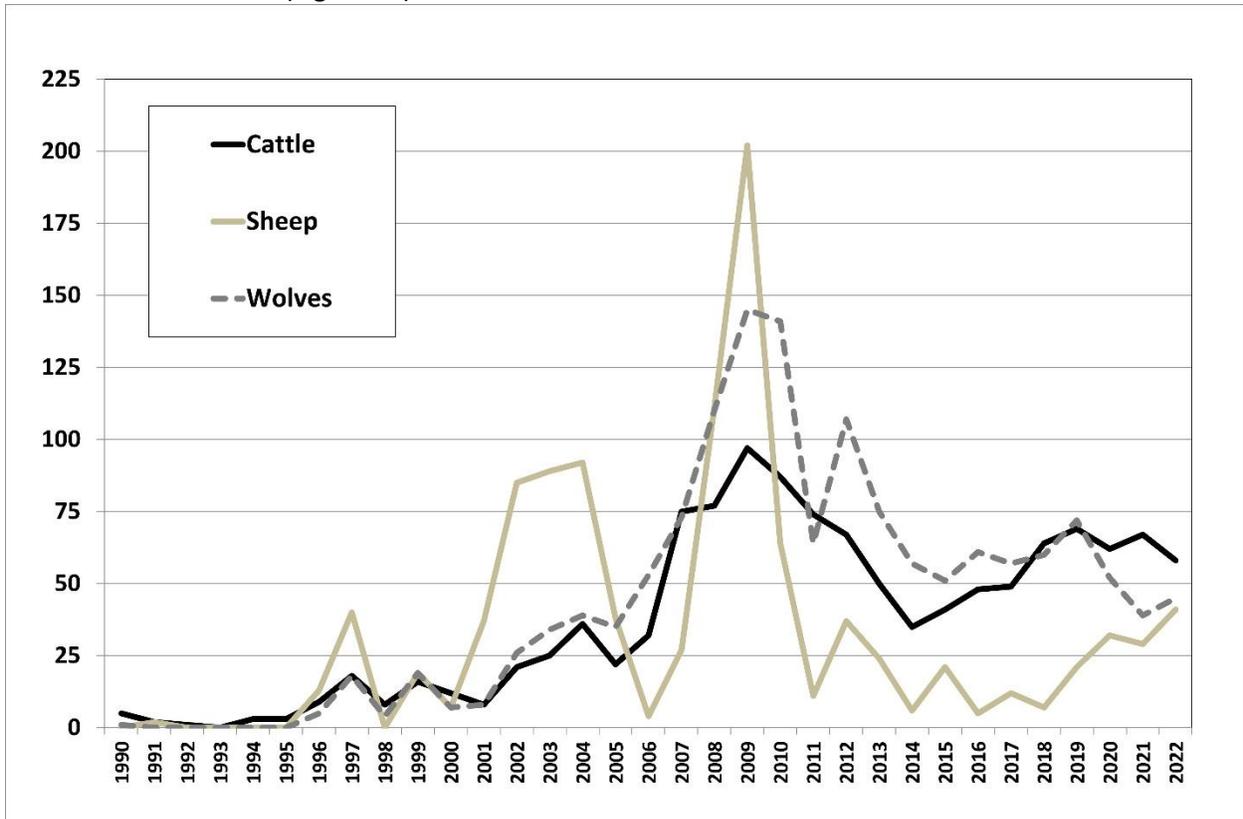


Figure 17. Number of cattle and sheep killed by wolves and number of wolves removed through agency control and legal depredation-related take by private citizens by federal fiscal year for livestock and calendar year for wolves, 1990–2022. Data collection on number of wolves removed per depredation is inconsistently recorded. Because removal efforts are targeted toward problematic packs, fewer total wolves are removed in livestock-related conflict mitigation (Parks et al. 2023).

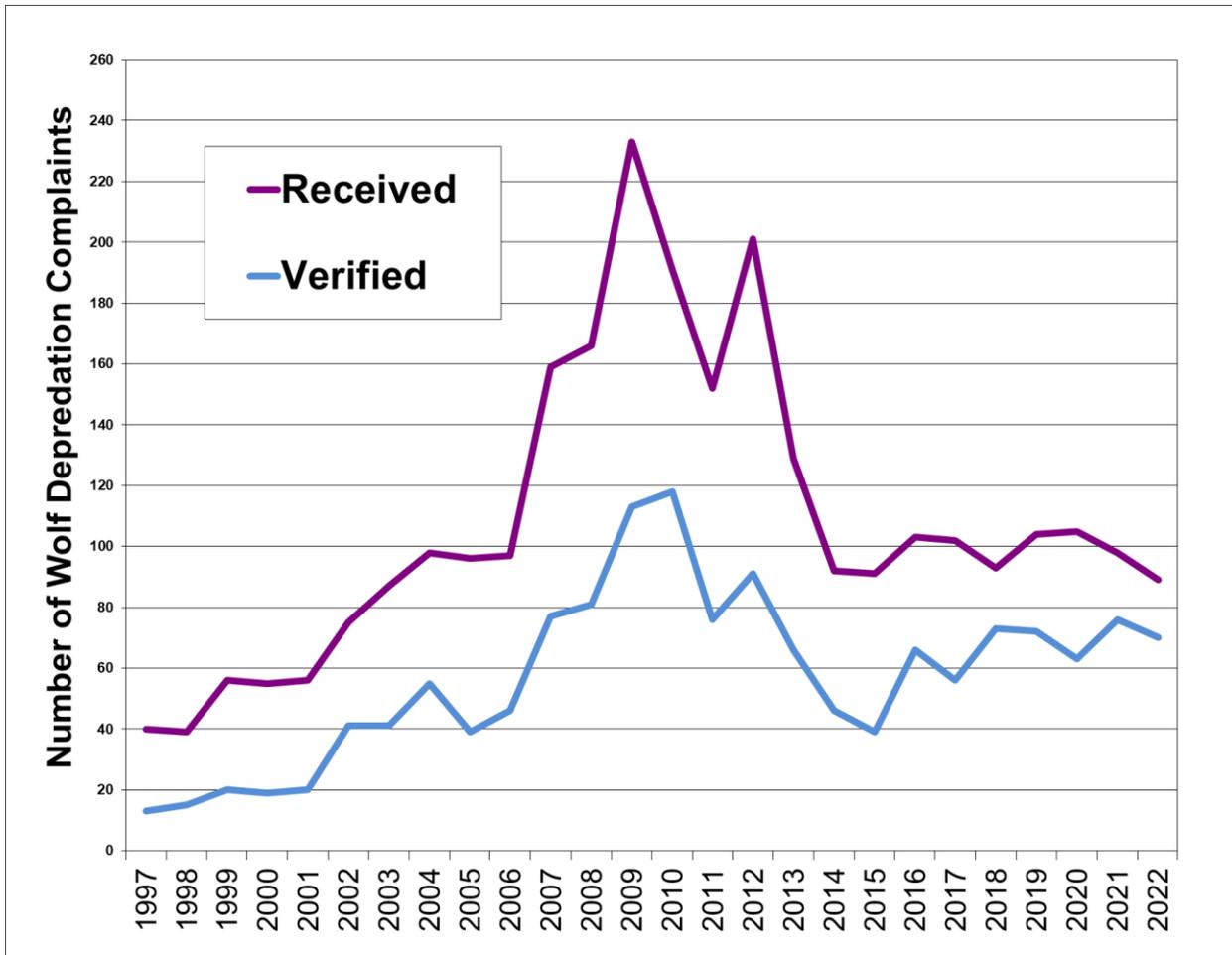


Figure 18. Number of complaints received by USDA Wildlife Services as suspected wolf damage and number of complaints verified as wolf damage by federal fiscal year, 1997-2022 (Parks et al. 2023).

Because the wolf population is at a sustainable level and under state authority, landowners or their agents may non-lethally harass a wolf or wolves without a permit if wolves are disrupting livestock on public or private land to discourage wolf activity in close proximity to livestock. Additionally, several Montana laws provide lethal removal options to mitigate conflicts with wolves. A landowner or their agent may lethally take a wolf on the landowner’s property if the wolf is a potential threat to human safety, livestock or dogs under § 87-1-901, MCA. Furthermore, if a wolf is in the act of attacking or killing a domestic dog, a citizen may lethally remove that wolf on public or private land under Montana state law known as the Lawful Taking To Protect Livestock Or Person statute (§ 87-6-106, MCA). If a wolf is killed under either of these state laws, the carcass must not be moved or disturbed, the scene must be secured, and the incident must be reported to FWP as soon as possible, but within 72 hours. The entire carcass must be returned to FWP. Game wardens (or biologists) have the primary responsibility for the field aspects of administration, implementation, and closing of these cases.

In lieu of a federal or state response, a licensed landowner, livestock producer, or their agent may also kill a wolf by adhering to the regulations for public harvest or conflict-related removals approved by the commission. A designated trapper or a licensed sportsperson may be authorized to lethally remove wolves on public or private lands, and are subject to licensing requirements and other public harvest regulations approved by the commission that govern the regulated hunting or trapping of wolves.

WS is the federal entity routinely called upon by state and federal agencies as well as the private sector to provide operational and technical assistance to control damage caused by wildlife. WS is a work unit of the Animal and Plant Health Inspection Service of the U.S. Department of Agriculture and operates under NEPA. Through a partnership between the United States Department of Agriculture and state agencies or the private sector, WS engages in a wide range of damage management activities, including research, consultation, control of problem animals, technical assistance, and public outreach. WS agents investigate depredation complaints, capture wolves for research and monitoring purposes, provide technical assistance to producers, develop and test non-lethal methods of depredation control, and remove wolves. Expenditures by WS related to wolf-livestock conflicts are funded by federal, state, and NGO entities (Table 2).

Table 2. Statewide WS expenditures by federal fiscal year, 2011—2022.

Year	Federal	FWP	RMEF	Livestock producers	MDOL Wolf Mitigation Fund	NGOs	MLLB	Total
2011-2012	\$182,995.00	\$110,000.00		\$18,422.00				\$311,417.00
2012-2013	\$212,823.00	\$110,000.00	\$25,700.00	\$28,700.00				\$377,223.00
2013-2014	\$138,548.00	\$110,000.00	\$25,000.00	\$11,650.00				\$285,198.00
2014-2015	\$111,243.00	\$110,000.00	\$25,000.00					\$246,243.00
2015-2016	\$129,594.00	\$110,000.00	\$25,000.00					\$264,594.00
2016-2017	\$168,642.00	\$110,000.00						\$278,642.00
2017-2018	\$205,070.00	\$110,000.00						\$315,070.00
2018-2019	\$204,917.00	\$110,000.00						\$314,917.00
2019-2020	\$230,600.00	\$110,000.00						\$340,600.00
2020-2021	\$241,423.00	\$135,000.00						\$376,423.00
2021-2022	\$349,275.00	\$135,000.00			\$98,259.00	\$34,577.00	\$20,601.00	\$637,712.00

FWP maintains an MOU with WS that documents and enhances the cooperative relationship between FWP and WS for planning, coordinating, and implementing wildlife damage control programs to reduce damage caused by grizzly bears, wolves, black bears, and mountain lions to agricultural, animal husbandry, forestry, wildlife, and public health and safety. WS agents respond to landowner or livestock producer wolf depredation complaints, conduct field investigations, and carry out management actions. The likelihood of detecting injured or dead livestock is probably higher on private lands where there is greater human presence than on remote public land grazing allotments. The magnitude of under-detection of livestock loss on public lands and allotments is unknown. WS investigates incidents involving livestock, including working dogs, guarding animals such as llamas, and alternative livestock. WS provides their report to the landowners, who may send it to the Montana Livestock Loss Board (MLLB) for consideration of reimbursement. WS makes recommendations about the resolution of specific conflicts as well as ways of improving agency effectiveness and overall conflict resolution procedures. FWP provides WS with guidelines for capture operations and procedures, reporting of investigative findings, management activities and outcomes, and coordinates with other state or federal agencies as appropriate. Further, the MOU will be assessed annually to determine overall effectiveness relative to livestock losses, agency response times and related costs, and the status of the wolf population itself.

This MOU is a formal recognition and clarifies that investigations of possible livestock depredations by wolves are the responsibility of WS in cooperation with FWP personnel, when possible. Despite the fact that WS maintains most responsibility for livestock depredations by wolves, FWP still maintains state authority for wolf management. Almost all depredation incidents investigated by WS within Montana occur on private land. A rapid agency field response is imperative so that evidence may be examined as soon as possible after the incident. When a depredation occurs (on public or private lands), livestock producers should report any suspected wolf depredations (injuries or death) or the disruption of livestock or guarding animals to WS directly, as is the case for other wildlife species such as mountain lions or bears. Any evidence at the scene should be protected and secured from disturbance. WS agents complete an investigation and file a report form summarizing the type and extent of damage, physical evidence, and a description of the site. WS must provide the following information: date of depredation, date of investigation, number and type of livestock killed or injured, location of depredation, county of depredation, landownership, pack name (if known), and intended control action. FWP maintains a database to tabulate, summarize, and assess trends in wolf-livestock conflicts based on these reports.

Upon WS completing a depredation investigation and confirming wolves were the cause of injured or dead livestock, WS will notify FWP of the results and planned control actions within 24 hours. Subsequent management actions are guided by the specific recommendations of the investigator, the provisions of this plan and by the multi-agency MOU. WS is authorized to remove any offending individuals after a first offense when wounded or dead livestock are present, with clear evidence the injury or death was caused by wolves without prior consultation, and have the ultimate discretion to decide how to respond to a confirmed depredation, regardless of population status. WS may consult with FWP or initiate non-lethal or lethal control, as appropriate and according to the MOU. Conflict history of the pack, attributes of the pack (e.g., size or reproductive status), or the physical setting are considered before a management response is selected. Specific actions range from catch, collar, and release on site, to lethal removal. Management actions are directed at individual wolves to the extent that they can be identified and clearly implicated. Non-selective methods such as poison will not be used. When wolves are killed by WS, their carcasses may be sexed, aged, and genetically sampled.

WS conducts lethal control actions on wolves on private, state, and federal lands, as well as on the Blackfeet Nation and the Confederated Salish and Kootenai Tribes lands. WS can use all approved methods to target and remove offending wolves, including aerial gunning. The number of wolves taken, the method of removal in consultation with the livestock producer and or landowner, as well as the location and duration of control efforts are determined by WS. Throughout this entire process, there is an expectation of regular communication between FWP and WS field staff so that both agencies are informed and aware of the response and any special circumstances. When wolf numbers are low, WS may use more conservative management tools. For example, WS may take an incremental approach to wolf removals to address wolf depredations. WS may also non-injuriously harass wolves or otherwise non-lethally intervene in any case where wolves are observed in the vicinity of livestock or present a threat to livestock where landowner permission is granted.

FWP routinely monitors wolves through radio-collaring efforts. If the depredation or damage occurs in an area without a radio-collared pack and WS cannot determine which pack or wolves were involved, WS may attempt to radio-collar at least one wolf in the area. FWP wolf specialists may also radio-collar wolves that may have been involved in conflicts to reduce wolf-livestock conflict and assist in accurate individual or pack removal (§ 87-5-132, MCA). If no radio-collared pack or wolves can be linked to the depredation, lethal removal up to and including a full pack of suspected wolves may occur.

The Montana Livestock Loss Board (MLLB) and the Montana Livestock Loss Program, developed in 2007 (60th Montana Legislature), addresses the economic impacts of verified wolf-caused livestock losses through compensation and application of prevention tools and incentives to reduce risk of losses. The purposes of the MLLB are 1) to provide financial reimbursements to producers for losses caused by wolves, grizzly bears, and mountain lions based on the program criteria, and 2) to proactively apply prevention tools and incentives to decrease the risk of wolf-caused losses and reduce the number of livestock killed by wolves through proactive livestock management strategies. Indirect losses and costs are not directly covered. Eligible livestock losses are cattle, calves, hogs, pigs, horses, mules, sheep, lambs, goats, llamas, and guarding animals. Confirmed and probable loss are reimbursed at 100% of fair market value (Figure 19). Veterinary bills for injured livestock that are confirmed due to wolves may be covered up to 100% of fair market value of the animal when funding is available. Hides of wolves taken by WS in response to livestock depredation may be prepared and sold by the Livestock Loss Board to help fund prevention and reimbursement costs (§ 2-15-2113, MCA). MLLB is attached to the Montana Department of Livestock.

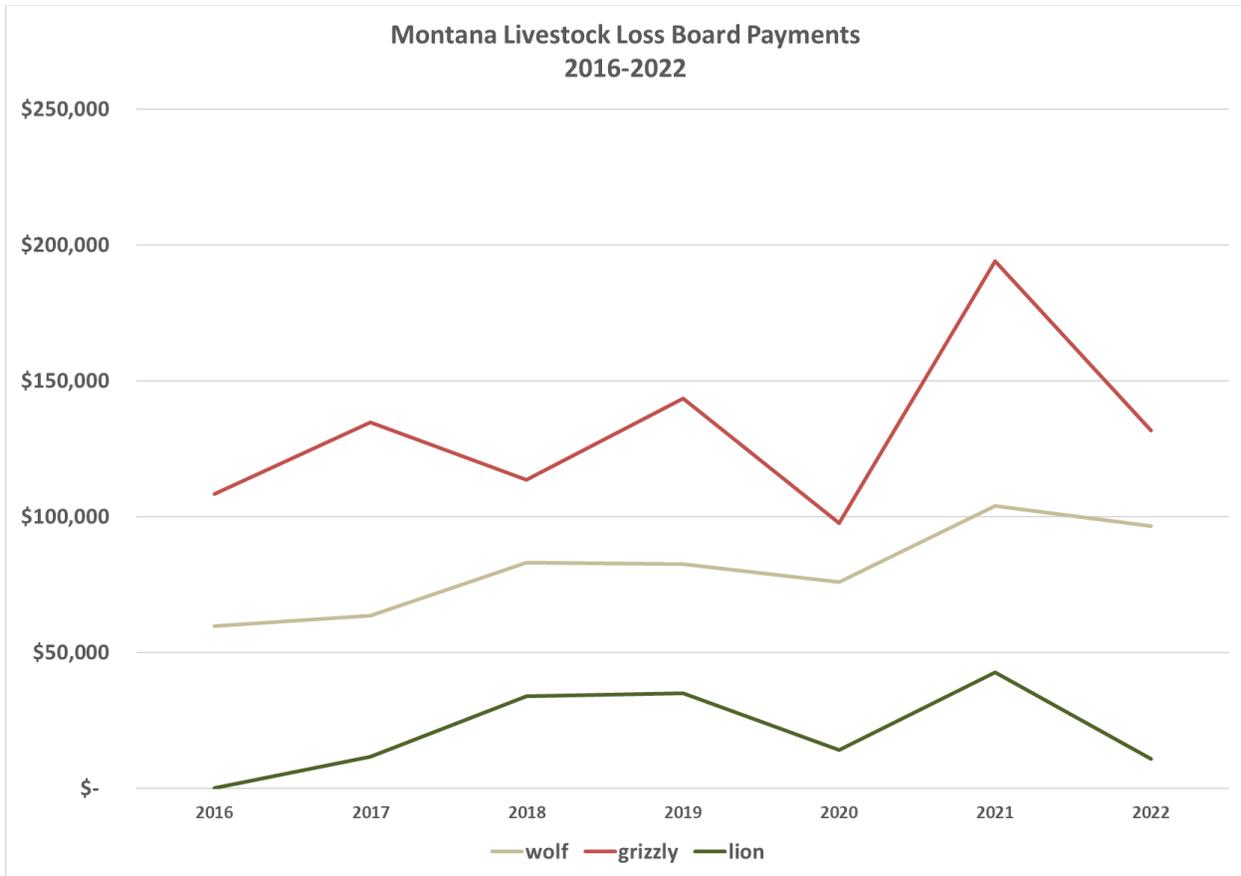


Figure 19. Dollars paid to livestock producers in MLLB payments by calendar year, 2016–2022 (Parks et al. 2023).

The MLLB has grants available to private landowners and livestock producers for conflict prevention. Grants pertaining to wolf conflict prevention require a 50% cost share by the applicant. Funds for these grants are authorized by the Montana Legislature. This cost-share program proactively implements measures to decrease the risk of predation on livestock as authorized by § 2-15-3111, MCA, with priority given to conflicts involving wolves and grizzly bears (§ 2-15-3110(6), MCA). Applicants must meet grant guidelines and grant selection is based on the magnitude and intensity of depredations, ranging from chronic occurrences to potential high-risk areas. Eligible applicants typically include livestock producers and grant amounts based on the average market value for the type and number of livestock to be targeted for prevention practices ([https://liv.mt.gov/\\_docs/LLB/Forms/LLB-Grant-Application-2023.pdf](https://liv.mt.gov/_docs/LLB/Forms/LLB-Grant-Application-2023.pdf)). Other considerations include acreage, effectiveness of proposed preventative measures, and cost of preventative measures. All fencing proposals must meet the fencing requirements under Montana law (§ 81-4-101, MCA), and the potential influence these preventative practices will have on neighbors is weighed and considered. Funding expenses associated with guard dogs include acquisition costs, standard veterinary examinations and vaccinations, food and other expenses incurred while the dogs are with the protected livestock. Grant recipients are mandated to regularly report their evaluation of the implemented practices and their success. All reports must include any depredations while the prevention practices were in place as well as comparisons of past annual losses to current losses. All activities must comply to the terms of any conservation easements, leases, zoning, or land use restrictions applicable to the property upon which the loss prevention practices will be conducted, as

well as with what is permitted by state, tribal, and or federal entities in their respective lease terms, laws, and regulations.

### **Wolf-human conflicts**

*Same as the No Action Alternative.*

### **Education and outreach program**

FWP recognizes the importance, value, and need for an educational program to parallel wolf management activities. The objective is to provide scientifically based information regarding wolves and their management in Montana, to help the public become more knowledgeable about this species and its management. FWP takes a leadership role in formulating and disseminating educational materials. However, the information sources will be wide-ranging and may include materials from other state and federal agencies, NGOs, and Native American tribes. All material included in the wolf education program must be factual and have a foundation of scientific scrutiny. FWP's Communication and Education Division is responsible for content development.

FWP's wolf program outreach and education efforts will be ongoing. Outreach activities take a variety of forms including field site visits, phone and email conversations to share information and answer questions, presentations to school groups and other agency personnel, media interviews, and formal and informal presentations. Additionally, Wolf Trapper Education seminars are required for all trappers who have not been a licensed trapper for at least three previous seasons (<https://www.registered.com/programs/montana/102-montana-wolf-trapping-certification-class>). In addition to these efforts, FWP prepares and distributes a variety of media releases to help Montanans become more familiar with Montana's wolf management (e.g., a hands-on resource guide to reduce depredations: <https://fwp.mt.gov/binaries/content/assets/fwp/conservation/wildlife-reports/wolf/wolfresourcesguide.pdf>). FWP publishes regular reports providing updates on contemporary scientifically-sound monitoring techniques, wolf population trends, harvest and conflict-based removal data, and changing regulations and policies as well as annual FWP gray wolf program reports (<https://fwp.mt.gov/conservation/wildlife-management/wolf>).

To enhance public understanding of Montana's wolf monitoring and management strategies, FWP will seek to continually improve transparency and provide information to the public. For example, in 2021 FWP developed a Wolf Harvest Dashboard website to provide real-time information on the status of wolf harvest in Montana for the current wolf hunting and trapping seasons (<https://experience.arcgis.com/experience/34fbb4c9509e45959f6291965388c345/page/Summary/>). The dashboard provides information on the number of wolves harvested in each region or WMU, the quota and quota status for each region or WMU, and detailed information for each harvest record. Additional harvest information can be found at <https://fwp.mt.gov/hunt/regulations/wolf> and <https://myfwp.mt.gov/fwpPub/harvestReports>. FWP also identified public confusion surrounding the floating start dates for wolf trapping in areas of occupied grizzly habitat. In response, FWP developed the Wolf Trapping Season Status Map, which provides weekly updates in November and December on trapping season start dates based on FWP evaluation of grizzly bear denning activity and can be found at <https://fwp.mt.gov/hunt/regulations/wolf>. Through public engagement, FWP will continue to identify needs and create effective education and outreach the capture the wide breadth of stakeholders.

### **Wolf program funding**

State law authorizes FWP to collect fees from hunters, trappers, and anglers (§ 87-1-601, MCA). Most of these revenues are channeled back into management of fish and wildlife under spending authority from

the Montana Legislature. In order to maintain FWP's eligibility to receive matching federal funding under the Federal Aid in Wildlife Restoration Act (Pittman-Robertson or PR), the Montana Legislature agreed to use hunting license revenue only for wildlife management (§ 87-1-708, MCA). Most of this funding is generated through excise taxes on firearms, ammunition, and archery equipment. Federal funding matches state license revenue to fund wildlife surveys, research, hunter education, and other management activities. Wildlife surveys and inventories and other approved projects typically receive 75% federal funding matched with 25% state funding from license revenues.

Funding for wolf conservation and management in Montana are described in § 87-1-623 and 87-1-625, MCA. Section 87-1-623, MCA, was created in 2011 (62nd Montana Legislative Session) by House Bill 363. This law requires that a wolf management account be set up and that all wolf license revenue be deposited into this account for wolf collaring and control. Specifically, it states that subject to appropriation by the legislature, money deposited in the account must be used exclusively for the management of wolves and must be equally divided and allocated for the following purposes: (a) wolf-collaring activities conducted pursuant to § 87-5-132, MCA; and (b) lethal action conducted pursuant to § 87-1-217, MCA, to take wolves that attack livestock. Section 87-1-625, MCA, was created in 2011 (62nd Montana Legislative Session) by Senate Bill 348. This law required FWP to allocate \$900,000 annually toward wolf management. "Management" is defined as includes the entire range of activities that constitute a modern scientific resource program, including but not limited to research, census, law enforcement, habitat improvement, control, and education. The term also includes the periodic protection of species or populations as well as regulated taking. In 2015 (64th Montana Legislative Session), Senate Bill 418 reduced the amount FWP must spend on wolf management to \$500,000 (§ 87-1-625, MCA).

Wolf license sales generate general revenue for fish and wildlife management in Montana (Figure 20). The number of wolf hunting licenses issued annually ranged from 15,520–24,478 and the number of trapping licenses issued to trappers with a required wolf trapping certification ranged from 1,508–3,124. Because trapping licenses for both residents and non-residents are not wolf-specific and response rate of trapper surveys is low (43–68%), FWP cannot accurately quantify the financial contribution that wolf trapping generates. Annual budget and expenditures also vary annually (Table 3). Budgets are developed internally, with authority to spend funds coming from the Legislature. All budgets are reviewed by the legislative budget committee and must be approved by both the Montana House and Senate. The governor's office can also approve budget amendments between legislative sessions. The commission reviews and approves the agency's overall budget. Specific to the wolf program, some of this funding (i.e., PR, wolf, and general license dollars) is used to pay for FWP's field presence to implement population monitoring, collaring, outreach, hunting, trapping, and livestock depredation response. Other wolf management services provided by FWP include law enforcement, harvest and quota monitoring, legal support, public outreach, and overall program administration. Revenues from wolf license sales are incorporated into the general license funding account, and the majority of funding in this account is driven by ungulate hunting opportunities.

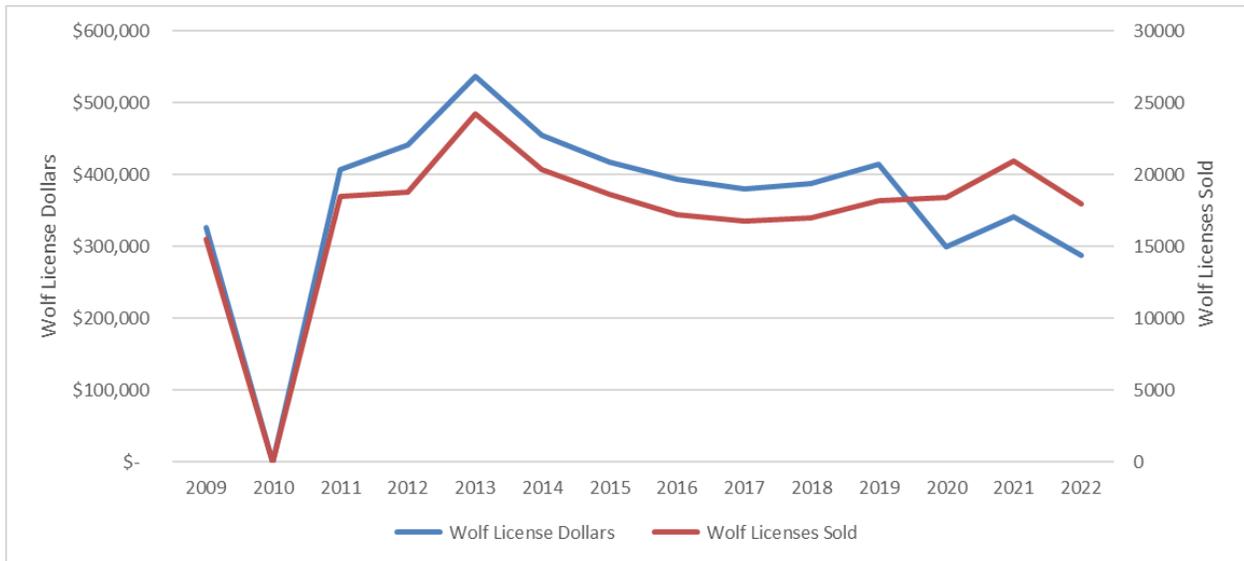


Figure 20. Number of wolf licenses (hunting) sold and revenue from wolf licenses in Montana by calendar year, 2009—2022. Values drop to 0 in 2010 because wolves were briefly relisted on the ESA.

Table 3. Wolf program budget by fiscal year, 2011—2022.

<b>Year</b>	<b>Federal<sup>1</sup></b>	<b>Pittman- Robertson (PR) Funds</b>	<b>State license dollars</b>	<b>HB363</b>	<b>Rocky Mountain Elk Foundation</b>	<b>Total</b>
2011-2012	\$625,000.00		\$275,000.00	\$163,000.00		\$1,063,000.00
2012-2013	\$625,000.00	\$60,400.00	\$214,600.00	\$163,000.00		\$1,063,000.00
2013-2014	\$390,908.00	\$153,102.00	\$390,075.00			\$934,085.00
2014-2015	\$372,778.00	\$216,000.00	\$479,059.00		\$50,000.00	\$1,067,837.00
2015-2016	\$257,653.00	\$13,215.00	\$355,174.00		\$48,629.00	\$626,042.00
2016-2017		\$332,357.00	\$357,759.00		\$365.00	\$690,116.00
2017-2018		\$231,581.00	\$594,573.00		\$25,001.00	\$826,154.00
2018-2019		\$216,640.00	\$489,599.00		\$25,001.00	\$706,239.00
2019-2020		\$236,050.00	\$492,437.50		\$25,001.00	\$728,487.50
2020-2021		\$316,056.46	\$492,437.50		\$25,000.00	\$808,493.96
2021-2022		\$211,474.00	\$767,474.00			\$978,948.00

<sup>1</sup>USFWS cooperative agreement

## **Public engagement process**

As part of the 2023 Wolf Plan and associated EIS, an extensive public process was used. Public scoping provides an opportunity for public and agency involvement during the early planning stages of the analysis. The intent of the scoping process is to gather comments, concerns, and ideas from those who have an interest in or who may be affected by the proposed action. Several strategies were used to inform the public about and solicit comments on the proposed action. These internal and public processes serve to fulfill the scoping requirements of MEPA. FWP requested input from the public on the direct, secondary, and cumulative impacts on the physical and human environments. The 30-day public scoping period began with the publication of the Scoping Notice on Wednesday, March 22, 2023, and continued through Saturday, April 22, 2023. FWP considered all applicable input provided during the virtual public scoping meetings (Tuesdays, April 4 and 11, 2023, 6-8 p.m. MST), as well as all applicable input received or postmarked by Saturday, April 22, 2023, in defining the scope of 2023 Wolf Plan and associated EIS.

The 2023 Wolf Plan and associated DEIS were published on the FWP website on Friday, October 20th, 2023. This began the 60-day public comment period, which concluded on Tuesday, December 19th, 2023 at 5 p.m. FWP considered all applicable input received by email or postmarked by the end of the public comment period. Additionally, FWP will hold in-person public meetings and one virtual meeting to engage, interact, and discuss with attendees.

According to the applicable requirements of ARM 12.2.439, following preparation of the 2023 Wolf Plan and associated Draft Environmental Impact Statement (DEIS), the agency distributed copies to persons who have requested copies and the general public affected by the proposed and preferred alternatives. These are public documents and may be inspected upon request. Any person may obtain a copy of either document by making a request to FWP. To fulfill MEPA requirements, the 2023 Wolf Plan and associated DEIS have been distributed through the following methods:

- Public notice has been served on the FWP website at: <https://fwp.mt.gov/aboutfwp/public-comment-opportunities/draft-wolf-mgmt-plan>
- Public notice has been served on the Montana Environmental Quality Council's MEPA Document List website at: <https://leg.mt.gov/mepa/search/>.
- FWP maintains a mailing list of persons interested in a particular action or type of action. FWP has notified all interested persons and alerted them to this public comment opportunity. The interested persons mailing list is available upon request from FWP.
- For more information on how to submit comments electronically, visit: <https://fwp.mt.gov/aboutfwp/public-comment-opportunities/draft-wolf-mgmt-plan>
- FWP has also issued a press release for use by the media.

Copies of the 2023 Wolf Plan and associated DEIS have also been sent to the governor, other affected state agencies, USFWS, and the Montana Environmental Quality Council for review.

Legislative processes are the mechanism for adoption, amendment, or repeal of statutes, and administrative rules result from public rule-making processes intended to more precisely implement statutes. Both are based on biological and sociopolitical input. Currently, these actions are exempt from MEPA. While both are a result of legislation, the processes for the public to actively participate and comment differs for statutes and administrative rules. If a member of the public would like to comment on the adoption, amendment, or repeal of a statute, they would do so during the legislative session. Statutes are the laws that FWP, as a state agency, is required to implement, and strategies for implementation are developed during the season-setting process under legislative authority that has been delegated to the commission. However, if a member of the public would like to comment on the

adoption, amendment, or repeal of administrative rules, they would do so during the commission process and or the Secretary of State's process. FWP releases public notices on its website for any upcoming decisions to be made related to administrative rules. Administrative rules are mechanisms by which FWP implements or further defines and reinforces the intent of statutes. Statutes and administrative rules work hand-in-hand allowing FWP and the commission to implement the legislature's mandates.

FWP collaborates and partners with federal agencies on wolf management and mitigation of wolf-livestock conflicts, as well as with other agencies, universities, and Tribal Nations to conduct biological and social research and monitoring. Eight Tribal affiliations were notified of and invited to consult on this plan and associated EIS: Blackfoot Tribe of the Blackfoot Indian Reservation of Montana, Confederated Salish and Kootenai Tribes of the Flathead Reservation, Chippewa Cree Tribe of Rocky Boy's Reservation, Fort Peck Assiniboine and Sioux Tribes of Fort Peck Indian Reservation, Crow Tribe of Crow Indian Reservation, Little Shell Tribe of Chippewa Indians of Montana, and Northern Cheyenne Tribe and Indian Reservation. Additional emails were sent to alert the Tribes and follow-up calls were made later in the comment period. To date, no concerns were communicated by any Tribe. Further consultation with the Tribes will be pursued in accordance with Section 106 of the NHPA (54 USC § 306108) and its implementing regulations (36 CFR Part 800).

Regarding ongoing wolf management, the public has the opportunity for continuous and iterative input into specific decisions about wolf harvest throughout the legislative and public season-setting processes. Opportunity for public comment is always available and welcomed. All past and upcoming commission meetings and associated agendas, which include memorandums of items discussed and their specific public processes and outcomes, are available on the FWP website (<https://fwp.mt.gov/aboutfwp/commission>). Opportunity for public comment is provided for all commission proposals (via email, phone, surveys). Further, the public is encouraged to attend commission meetings where an opportunity to speak directly to the commission is provided. Harvest regulations are decided and adopted by the commission, within the constraints and delegation of authority provided for under statutes and administrative rules. Additionally, FWP may choose to obtain public input through other approaches (e.g., focus groups, citizens advisory groups, surveys) as deemed appropriate.

## **2.4.2 OPERATIONS PLAN AND OBJECTIVES**

If the proposed action is implemented, public transparency regarding how FWP monitors and manages wolves would be prioritized. Management of wolves within the state will be under the direction of a new, programmatic 2023 Wolf Plan, which will be developed using the 2003 Wolf Plan as a foundation. The 2023 Wolf Plan is fully compliant with responsibilities under the ESA (i.e., sustainable levels above that which would warrant delisting on the ESA and subsequent loss of state management of the species), and consistent with commitments made by existing agreements with federal, other state, and tribal agencies. If the proposed action of adopting and implementing a 2023 Wolf Plan is approved the following objectives will guide implementation. These management objectives were originally developed to inform the 2010 season proposal, before wolves were delisted later that year, as described in Runge et al. (2013). Since that time, these management objectives have been incorporated into most wolf season proposals drafted by FWP since that time. The originally written third objective was changed from listing "livestock producers, hunters, and other stakeholders" to "all stakeholders" to be inclusive of the diversity of values pertaining to wolves. These management objectives include, but are not limited to:

1. Maintain a viable and connected wolf population in Montana.
2. Maintain authority for State of Montana to manage wolves.
3. Maintain positive and effective working relationships with all stakeholders.
4. Reduce wolf impacts on
  - a. livestock, and
  - b. big game populations.
5. Maintain sustainable hunter opportunity for wolves.
6. Maintain sustainable hunter opportunity for ungulates.
7. Increase broad public acceptance of sustainable harvest and hunter opportunity as part of wolf conservation.
8. Enhance open and effective communication to better inform decisions.
9. Learn and improve as we go.

### **Guide Management**

The 2023 Wolf Plan guides statewide management of wolves. The 2023 Wolf Plan is purposely developed to be adaptable and flexible as new science and monitoring methodologies become available, as ecological, biological, and sociopolitical environments inevitably fluctuate, and to accommodate changes in law, political leadership, and overall wolf management strategy.

### **Provide Clarity**

The 2023 Wolf Plan intends to provide transparency on how wolves are monitored and managed in Montana. The 2023 Wolf Plan aims to provide current information on how FWP arrives at population estimates, develops harvest (i.e., hunting and trapping) regulations, and provides opportunities for public engagement and participation. FWP explicitly states wolf population and management objectives in this DEIS, while being clear about the needed fluidity of those objectives.

## **2.4.3 MITIGATION STRATEGIES FOR RESOURCE IMPACTS**

If the proposed action is implemented FWP would continue to develop and implement contemporary, rigorous methodologies to monitor wolf populations. FWP would continue to be proactive in minimizing wolf-livestock conflicts (via lethal and non-lethal strategies). FWP will continue to be transparent and welcome public participation on harvest regulation development and implementation process. Wolf population abundances and densities (and associated metrics [e.g., number of packs, pack size, territory area]), distribution, and conflict and harvest numbers will continue to be monitored and summarized in regularly published reports.

### **Population monitoring and estimation**

Under the *Proposed Alternative* of adopting and implementing the 2023 Wolf Plan, wolves would be monitored using contemporary science-based (i.e., peer-reviewed) methodologies. iPOM is a modern, scientifically peer-reviewed, and cost-effective means of monitoring wolves, and is a very efficient method to document wolf population numbers and trends accurately across the distribution of wolves in Montana (Sells et al. 2020, Sells et al. 2021, Sells et al. 2022a, Sells et al. 2022b). The iPOM method uses annual hunter surveys, known wolf pack locations, habitat covariates, and estimates of wolf territory size and pack size based on field data to estimate wolf distribution and population size (Sells et

al. 2020, Sells et al. 2022b). With iPOM, an occupancy model estimates the extent of wolf distribution in Montana, while a territory model predicts territory sizes. Altogether, these models predict the number of wolf packs in the occupied area. A group size model predicts pack sizes. Total abundance estimates are derived by combining the estimated number of packs and pack sizes, while also accounting for lone and dispersing wolves. iPOM estimate of wolf population size is currently the preferred monitoring method due to the accuracy, incorporation of statistical uncertainty, and cost efficiency. FWP will use iPOM to monitor wolves until better science-based methods become available and are practical with implementable strategies across the vast portion of Montana occupied by wolves.

FWP is confident that the wolf population estimate and trends that iPOM provides are accurate and scientifically valid evidence that can be used to assess wolf status relative to the criteria outlined in the 2023 Wolf Plan. However, wolf specialists and area biologists still regularly collect data on wolves in the field. The iPOM tool is regularly supplemented through visual confirmations of radio-collared individuals and their packs, minimum counts, non-invasive surveys, and demographics of harvested and conflict-related removals. These datasets are collected and assembled annually for trend information but alone do not provide accurate population estimation. FWP uses well-documented scientific methodologies (i.e., iPOM) to estimate population sizes and distributions from which hunting and trapping regulations are developed and recommended.

Although FWP personnel carry out the primary monitoring duties, opportunities for research collaboration with other agencies, universities, non-profit organizations, volunteers, and tribal wildlife authorities will be pursued. Permits to conduct research, particularly if live capture is required, are issued by FWP to ensure that the work is scientifically justified and conducted in an ethical, responsible manner. FWP partners with University of Montana, Montana State University, USFWS, United States Forest Service (USFS), National Park Service (NPS), private landowners, and others to conduct research pertaining to predator-prey interactions (see References for peer-reviewed scientific literature that includes FWP sponsorship, partnership, and or participation). FWP capitalizes on opportunistic ways to collect data, such as DNA sampling from harvested or removed individuals to continue surveillance of population genetic connectivity and viability. Additionally, human dimensions studies use surveys and questionnaires to quantify human values, beliefs, and attitudes toward wolves on various topics. FWP conducts human dimensions research and identifies problems or areas of public concern so that targeted work efforts are more effective. These efforts help to identify special management needs, opportunities, and constraints.

### **Harvest strategies**

FWP will maintain the population baseline derived from the federal recovery definition of 150 wolves and 15 breeding pairs (or another stated minimum threshold if modified, in coordination with the USFWS benchmark for ESA recovery [50 CFR Part 17, Docket No. FWS-R6-ES-2011-0032; 92220-1113-0000; ABC Code: C6]). Further, the minimum baseline metric used will be modified to the number of wolves and wolf packs needed to sustain and maintain a viable wolf population. By dividing the mean estimate of population size from iPOM by the mean number of documented breeding pairs in Montana from 2011–2017, the number of wolves per breeding pair can be estimated. By then multiplying the number of wolves needed per breeding pair by 15 (the federal minimum requirement for breeding pairs), an estimate of the number of wolves needed to ensure Montana has at least 15 breeding pairs can be calculated.

Using iPOM population estimates for the statewide number of wolves and documented breeding pairs from 2011 to 2017 generates 29.15 wolves/breeding pair. For comparison, the newer numbers (2018–2022) provide an estimate of 20.36 wolves/breeding pair. The long-term 10-year average (2012–2022) gives an estimate of 24.65 wolves/breeding pair. These estimates suggest a range of 305–437 wolves would be needed to support 15 breeding pairs, with a 10-year average of about 370 wolves.

To be cautious in maintaining delisted status and state management of wolves, FWP will use 450 wolves as determined by iPOM, as the benchmark to ensure the population maintains at least 15 breeding pairs, which also surpasses the minimum requirement of 150 wolves. That number may change if the monitoring methods change in the future. While minimum counts and documented breeding pairs provided valuable information on wolf population trends in the early days after recovery, those metrics became increasingly difficult to document at a meaningful scale and less representative of the overall population with the rapidly growing wolf population. To address this concern, Montana progressed to population estimation via iPOM to balance resources with population monitoring needs. Because this update also led to changes in field monitoring methods, recent efforts to document breeding pairs may not be consistent with earlier years. Ultimately, the shift from reporting the minimum number of breeding pairs to the number of wolves equivalent to the number of breeding pairs will improve consistency with updated population monitoring methods and outputs from iPOM (total estimated number of wolves) that would ensure the metric used for a minimum threshold is current relative to monitoring methods.

While a minimum baseline will be used to ensure Montana maintains management authority for wolves, FWP does not administratively declare an upper limit of wolves in the state in the sense of a “cap.” Section 87-1-901, MCA, passed as Senate Bill 314 by the 2021 Montana Legislature, states that, “the commission shall establish by rule hunting and trapping seasons for wolves with the intent to reduce the wolf population in this state to a sustainable level, but not less than the number of wolves necessary to support at least 15 breeding pairs.” The population at the end of 2020, prior to passage of Senate Bill 314 was 1,177 (1,069–1,290) wolves. To clarify, FWP will manage according to legislative and commission direction to reduce the population. Should the wolf population decline to the point it approaches 450 wolves (the minimum number of wolves needed to ensure 15 breeding pairs) FWP would shift management strategies.

Several changes to wolf harvest season resulted from the 2021 Montana Legislative Session. Specifically, the legislature mandated the commission to establish “hunting and trapping seasons for wolves with the intent to reduce the wolf population in this state to a sustainable level, but not less than the number of wolves necessary to support at least 15 breeding pairs.” § 87-1-901, MCA. The purpose of the change was to increase individual harvest opportunity, balance ecological and sociopolitical needs and tolerance, and ensure the maintenance of a healthy wolf population in compliance with federal recovery mandates. Because the wolf population is considerably greater than the federal recovery threshold, there remains a great deal of flexibility to both reduce the wolf population and still maintain a sustainable population. Three sections of the MCA are of significance to recent changes in wolf harvest and season structure that provide the tools that may be used to achieve the population reduction. As a result of House Bill 225 (67th Montana Legislature), § 87-1-304, MCA, provides the commission with the authority to initiate a wolf trapping season that begins the first Monday after Thanksgiving and closes on March 15, while also providing the commission with the latitude to adjust the start of the trapping season for specific wolf management units based on regional recommendations. As a result of House Bill 224 and Senate Bill 314 (67th Montana Legislature), § 87-1-901, MCA, states that trapping seasons must

allow for use of snares by holders of a trapping license, mandates the commission to reduce Montana's wolf population to a lower, sustainable level, but no lower than the number of wolves needed to maintain 15 breeding pairs, and provides the commission with the authority to apply different management techniques depending on conditions in each administrative region. Some of these techniques include allowing unlimited take of wolves on a single wolf hunting or trapping license, allowing use of bait while hunting or trapping wolves, and allowing hunting of wolves on private lands outside daylight hours with use of artificial light or night vision scopes. Section 87-6-214, MCA, as a result of Senate Bill 267 (67th Montana Legislature), allows for reimbursement of costs incurred related to the hunting or trapping of wolves for individuals licensed to hunt or trap wolves.

Harvest management will proceed flexibly, but all hunting and trapping would likely be restricted if the statewide wolf population approaches 15 breeding pairs or 450 wolves. As the wolf population fluctuates, FWP will continually assess population status and analyze and adjust harvest management strategies. After wolf harvest seasons began in Montana, FWP determined the amount of human-caused mortality has not negatively influenced the probability a pack will contain a successful breeding pair, despite the lack of significance of the relationship which was likely influenced by the difficulty of identifying breeding pairs (Figure 15). However, if human-caused mortality reaches a level that significantly reduces the population size and the ability to maintain 15 breeding pairs or 450 individuals, the harvest strategy would be reevaluated. This plan is not prescriptive and does not specify more precise population targets beyond those levels set forth in § 87-1-901, MCA, which are subject to change via future legislation, nor at what point more conservative regulations will be enacted or more liberal regulations restricted. These decisions and the associated risk-tolerance are under the purview of the elected or appointed public trustees, including the FWP Director, the Governor, the commission, and the legislature. FWP season proposals will ultimately be decided on by the commission, including decisions about season types and the associated risk tolerance under delegated authority from the legislature, unless or until new laws passed by the legislature further define the parameters of commission decision making authority. All these decisions and processes will be informed by the latest science and information. However, the policy direction, regulations, and, ultimately, the wolf population are likely to fluctuate through time as elected and appointed trustees change. At their discretion, the commission may use FWP recommendations and wolf season options to guide harvest structure based on population trends.

While a minimum baseline will be used to ensure Montana maintains management authority for wolves, FWP does not administratively declare an upper limit of wolves in the state in the sense of a "cap." Section 87-1-901, MCA, passed as Senate Bill 314 by the 2021 Montana Legislature, states that, "the commission shall establish by rule hunting and trapping seasons for wolves with the intent to reduce the wolf population in this state to a sustainable level, but not less than the number of wolves necessary to support at least 15 breeding pairs." The population at the end of 2020, prior to passage of Senate Bill 314 was 1,177 (1,069–1,290) wolves. To clarify, FWP will manage according to legislative and commission direction to reduce the population. Should the wolf population decline to the point it approaches 450 wolves (the minimum number of wolves needed to ensure 15 breeding pairs) FWP would shift management strategies.

### **Wolf-livestock conflict and response**

In Montana, wolves routinely encounter livestock on both private and public land, but most depredations occur on private land (83% in 2005–2015; DeCesare et al. 2018). Wolves are opportunistic

predators, most often seeking wild prey. However, some individual wolves and packs learn to prey on livestock which can be difficult to stop if the whole pack is involved (Harper et al. 2005). Once a pack has learned to kill livestock, the probability of depredation recurrence is high without intervention (Bradley et al. 2015). Because livestock depredation is a learned behavior, preventive methods may be most effective when employed proactively before a depredation occurs. Wolf depredations on private land are more likely to occur where natural prey is present, if pastures are larger in size, if there is a greater abundance of cattle, and if cattle graze farther from human-developed areas (Mech et al. 2000, Bradley and Pletscher 2010). To address wolf-livestock conflicts, FWP uses an integrated program of non-lethal and lethal conflict management tools (Bangs et al. 2006, Gese et al. 2021), and actively partners on non-lethal proactive conflict mitigation projects across the state (Wilson et al. 2017). For wolves, harvest and lethal removal following conflicts are important management tools, although neither are enough to completely resolve or prevent future conflicts (Bradley et al. 2015, DeCesare et al. 2018). The intent of non-lethal methods is to prevent or resolve a wolf conflict without killing the wolf or wolves in question but may sometimes be used in conjunction with lethal methods. There are a variety of non-lethal tools and many have proven successful in certain contexts (Moreira-Arce et al. 2018, Bruns et al. 2020), such as when applied conditionally (e.g., based on terrain, proximity to den or rendezvous sites, avoiding overexposure to techniques that would result in habituation; Stone et al. 2017). In Montana, as of 2015, the percentage of livestock operations using non-lethal methods to control predators was 14.5% (USDA 2015).

FWP will work cooperatively with livestock producers, NGOs, and WS to reduce risk of wolf-livestock conflicts by implementing these tools when deemed appropriate. FWP will actively engage by sharing information, technical expertise, equipment, materials, and hands-on field assistance. Furthermore, FWP will continue to collaborate on research designed to improve our understanding of current and developing proactive non-lethal tools. With increasing need for funding and technical assistance to make proactive conflict prevention tools available to livestock producers, FWP will encourage coordination of all stakeholders striving to reduce wolf-livestock conflicts and support working lands and wildlife.

Non-lethal management strategies are actively promoted to prevent conflict (Bangs et al. 2006), but over time or in certain situations, lethal measures may be necessary. FWP will consider non-lethal management techniques if the wolf population is declining and approaching 15 breeding pairs or 450 wolves. However, even when livestock producers regularly use non-lethal strategies, they are not always enough to effectively prevent all conflicts. All management strategies (lethal and non-lethal) employed require time, financial, and personnel costs to the livestock producer as well as to state and federal agencies. The use of some non-lethal strategies to prevent predator conflicts (from equipment to increased human-hours) are about 10 times more costly than lethal strategies (USDA 2015). As a result, livestock producers may employ certain non-lethal preventative strategies (e.g., modified husbandry practices) but not others (e.g., range riders) because it is simply too expensive.

Directed wolf removal can be an effective tool to reduce wolf-livestock conflicts, particularly when compared to no action (Harper et al. 2010). Rapid response time and larger numbers of wolves removed reduces the occurrence of subsequent livestock depredations (Bradley et al. 2015) and reduces risk to neighboring livestock in the same area (DeCesare et al. 2018). FWP does not translocate wolves to reduce wolf-livestock conflicts. The USFWS translocated wolves away from depredation sites in the 1990s when wolves were first recovering but translocated wolves in Montana had poor success at reestablishing and surviving, and often continued depredating (Bradley et al. 2005). In addition, now that wolf populations are recovered, there are no longer suitable release sites where other wolves do

not exist. Wolf depredations on private land are more likely to occur where natural prey is present, if pastures are larger in size, if there is a greater abundance of cattle, and if cattle graze farther from human-developed areas (Mech et al. 2000, Bradley and Pletscher 2010). Wolf depredations in Montana tend to recur in the same areas through time, and these areas tend to have higher densities of wolves and livestock (DeCesare et al. 2018). The type of livestock (i.e., breeds), their inherent behaviors (e.g., grouping), and how livestock producers respond (i.e., reading their behaviors when on range) may lead to lower risk of depredation threats for certain herds. Additionally, a neighbor's land, wildlife, and livestock management strategies may influence what occurs to another's livestock herd and the most effective resolution options available to them. Financial losses may result directly from wolf depredation. Indirect costs may accumulate because of increased management activities or changes to agricultural operations.

FWP maintains an MOU with WS that documents and enhances the cooperative relationship between FWP and WS for planning, coordinating, and implementing wildlife damage control programs to reduce damage caused by grizzly bears, wolves, black bears, and mountain lions to agricultural, animal husbandry, forestry, wildlife, and public health and safety. WS agents respond to landowner or livestock producer wolf depredation complaints, conduct field investigations, and carry out management actions. The likelihood of detecting injured or dead livestock is probably higher on private lands where there is greater human presence than on remote public land grazing allotments. The magnitude of under-detection of livestock loss on public lands and allotments is unknown. WS investigates incidents involving livestock, including working dogs, guarding animals such as llamas, and alternative livestock. WS provides their report to the landowners, who may send it to the Montana Livestock Loss Board (MLLB) for consideration of reimbursement. WS makes recommendations about the resolution of specific conflicts as well as ways of improving agency effectiveness and overall conflict resolution procedures. FWP provides WS with guidelines for capture operations and procedures, reporting of investigative findings, management activities and outcomes, and coordinates with other state or federal agencies as appropriate. Further, the MOU will be assessed annually to determine overall effectiveness relative to livestock losses, agency response times and related costs, and the status of the wolf population itself.

### **Transparency and public participation**

Harvest regulations are presented as formal recommendations, and FWP solicits public comment on such proposals. Following public comment, a final recommendation is forwarded to the commission for their consideration. Through annual commission oversight and public input, hunting and trapping take place under designated seasons and regulations which describe legal means of take, license requirements, and reporting and tagging requirements. This process is similar to that of all other game or furbearing species. Regulated hunting and trapping of wolves will take place within the larger context of multi-species management programs, rather than the context of single species management. Specific harvest objectives depend on regional densities, distributions, trends, and sociopolitical environment. Wolves could be promoted (on remote public lands) or discouraged (in areas with high livestock densities) depending on harvest objectives, district boundaries, and pack distribution. Harvest of wolves is not permitted in National Parks. Tribal government maintain wildlife management authority on their respective Native American Reservation. Some tribal governments implement a wolf season.

The public has the opportunity for continuous and iterative input into specific decisions about wolf harvest throughout the legislative and public season-setting processes. Opportunity for public comment

is always available and welcomed. All past and upcoming commission meetings and associated agendas, which include memorandums of items discussed and their specific public processes and outcomes, are available on the FWP website (<https://fwp.mt.gov/aboutfwp/commission>). In addition, opportunity for public comment is provided for all commission proposals (via email, phone, surveys). Further, the public is encouraged to attend commission meetings where an opportunity to speak directly to the commission is provided. Harvest regulations are decided and adopted by the commission, within the constraints and delegation of authority provided for under statutes and administrative rules. Legislative processes are the mechanism for the adoption, amendment, or repeal of statutes, and administrative rules result from public rule-making processes intended to more precisely implement statutes. Statutes are the laws by which FWP, as a state agency, is required to implement, and strategies for implementation are developed during the season-setting process under legislative authority that has been delegated to the commission. Statutes and administrative rules work hand-in-hand and allow FWP and the commission to implement the legislature's mandates.

Legislative processes are the mechanism for adoption, amendment, or repeal of statutes, and administrative rules result from public rule-making processes intended to more precisely implement statutes. Both are based on biological and sociopolitical input. Currently, these actions are exempt from MEPA. While both are a result of legislation, the processes for the public to actively participate and comment differs for statutes and administrative rules. If a member of the public would like to comment on the adoption, amendment, or repeal of a statute, they would do so during the legislative session. Statutes are the laws that FWP, as a state agency, is required to implement, and strategies for implementation are developed during the season-setting process under legislative authority that has been delegated to the commission. However, if a member of the public would like to comment on the adoption, amendment, or repeal of administrative rules, they would do so during the commission process and or the Secretary of State's process. FWP releases public notices on its website for any upcoming decisions to be made related to administrative rules. Administrative rules are mechanisms by which FWP implements or further defines and reinforces the intent of statutes. Statutes and administrative rules work hand-in-hand allowing FWP and the commission to implement the legislature's mandates.

## **2.5 ALTERNATIVES NOT CARRIED FORWARD FOR DETAILED ANALYSIS**

FWP's alternatives development process was designed to identify a reasonable range of alternatives for detailed analysis in the DEIS. FWP developed alternatives in accordance with its authorities (described in **Chapter 1.4.1, Agency Authority and Actions**). Alternatives or alternative components were suggested by the public in scoping comments or by subject matter experts based on professional experience. Those considered during the development process, but not carried forward for detailed analysis, are discussed in the following sections.

§ 75-1-220(1), MCA, defines "alternatives analysis" to mean an alternate approach or course of action that would appreciably accomplish the same objectives or results as the proposed action; design parameters, mitigation, or controls other than those incorporated into a proposed action by an applicant or by an agency prior to preparation of an EA or draft DEIS; no action or denial; and for

agency-initiated actions, a different program or series of activities that would accomplish other objectives or a different use of resources than the proposed program or series of activities. The agency is required to consider only alternatives that are realistic, technologically available, and that represent a course of action that bears a logical relationship to the proposal being evaluated.

To be considered, an alternative must meet all the following criteria (based on ARM 1417.4.603(2) and § 75-1-220(1) and § 75-1-201(1)(b)(4)(C), MCA. The alternative must:

- Appreciably accomplish the same objectives or results as the proposed action;
- Meet the purpose and need as stated in **Chapter 1.3 Purpose and Need**;
- Represent a course of action that bears a logical relationship to the proposal being evaluated;
- Be technically feasible (achievable by using current technology); and
- Be economically feasible (based on similar projects having similar conditions and physical locations, regardless of the economic strength of the specific project sponsor).

## **2.5.1 TROPHIC-CASCADE – NATURALLY REGULATED WOLF POPULATION**

FWP might conceivably consider an alternative approach under which there would be no numerical wolf population objective or cap and the wolf population would be allowed to find a natural carrying capacity, regulated only by ecological processes. This management plan would solely focus on wolf conservation, reclassify wolves as species of concern, and the harvest of wolves through hunting and trapping seasons would be eliminated. Lethal-management strategies would be eliminated from utilization, aside from provisions for wolf-livestock conflict mitigation, protection of property (§ 87-1-901, MCA), or an actively threatening wolf (§ 87-6-106, MCA). Removal or take of wolves outside of these sideboards would be considered illegal, poaching. FWP understands the wide breadth and diversity of values of Montanans (see **Chapter 3, Section 3.1.3**). Although this alternative would theoretically create the most certainty that wolves would thrive indefinitely in Montana, FWP considers this approach naïve, costly, and impractical.

FWP recognizes that wolves are involved in several interspecific interactions, many of which have top-down effects in the wildlife communities to which they belong. The relationships between carnivores and other species, and the ecosystems in which they live, is extremely complex and dependent on ecological, environmental, and landscape factors (Estes 1996). Despite volumes of published literature on wolves, there is limited evidence of the precise nature, degree, and mechanisms by which wolves affect ecosystems via cascading effects across trophic levels (i.e., trophic-cascades; Silliman and Angelini 2012, Hale and Koprowski 2018). Density-dependent factors (Kauffman et al. 2010), weather and climate change (Despain 2005), and independent population dynamics of other species (Wolf et al. 2007, Bilyeu et al. 2008) also influence prey population fluctuations. See **Chapter 1, Section 1.2.1** for more information on interspecific interactions involving wolves. Private land management practices would further limit trophic-cascade effects between wolves and ungulate species. Variation in how landowners manage their property may attract, deter, or exclude other wildlife, regardless of the influence of wolves. Therefore, the impacts of wolves on prey species and subsequent indirect impacts on aspects in the surrounding ecosystem are confounded.

There are also politically-based issues that do not align with this alternative. First, Governor Gianforte determined there is a need for the 2023 Wolf Plan to flexibly manage wolves, based on a changing ecological and sociopolitical environment, for population sustainability and longevity. Further, to uphold its obligation to protect, enhance, and regulate the use of Montana's fish and wildlife resources for public benefit now and in the future (§ 87-1-201, MCA), it is imperative FWP maintains healthy populations of *all* species and habitats that may be directly or indirectly impacted by wolves. It is also the responsibility of FWP to provide harvest opportunities (i.e., hunting/trapping) of game species to the public, as part of Montana heritage (§ 87-1-217, MCA). In order to maintain a stable ecosystem, management of classified species is necessary, and thereby, a trophic-cascade alternative is impractical and unreasonable. Also, importantly, FWP is mandated by law to implement legislation regarding wolves that includes hunting and trapping as an element of wolf management (§ 87-1-901, MCA).

Thus, the trophic-cascade alternative was dismissed from further, detailed consideration and analysis.

## **2.5.2 NO-MANAGEMENT – WOLVES ELIMINATED THROUGHOUT MONTANA**

FWP might conceivably consider an alternative approach under which wolf presence would not be tolerated anywhere in Montana. This management strategy would focus on the elimination of wolves. In other words, there would be no need for state management authority to regulate take of wolves. A no-management alternative would not require the 2023 Wolf Plan to be developed and would not utilize the 2003 Wolf Plan. Wolves would be reclassified as predators or as non-game wildlife, meaning that harvest (i.e., hunting and trapping) would not be regulated by federal or state laws or regulations. Wolves could be harvested without a license year-round throughout Montana, with no quotas, thresholds, or bag limits.

A no-management alternative would risk wolf population sustainability and maintenance above population levels mandated by the USFWS. FWP does not support increased pressure on wolves that would cause population declines below standards of established population viability and longevity that may warrant ESA-relisting and subsequent loss of state management authority for the species. More importantly, risking the loss of wolves on the landscape would have several negative impacts to both the wildlife communities to which they belong (see **Chapter 1, Section 1.2.1**) as well as directly contradict the values of some Montanans (see **Chapter 3, Section 3.1.3**). Although this alternative would theoretically limit the potential for and presence of wolf-livestock conflicts, FWP considers this approach naïve, impractical, and biologically-unnecessary.

There are also politically-based issues that do not align with this alternative. First, Governor Gianforte determined there is a need for the 2023 Wolf Plan to flexibly manage wolves, based on a changing ecological and sociopolitical environment, for population sustainability and longevity. Further, to uphold its obligation to protect, enhance, and regulate the use of Montana's fish and wildlife resources for public benefit now and in the future (§ 87-1-201, MCA), it is imperative FWP maintains healthy populations of *all* fish and wildlife species and habitats that may be directly or indirectly impacted by wolves. Without the management of wolves, other species in the community may experience changes in their population dynamics and or modify their behaviors, inadvertently impacting the habitat quality and quantity available to all species. It is also the statutorily mandated responsibility of FWP to provide harvest opportunities (i.e., hunting/trapping) of game and furbearer species to the public, as part of Montana's heritage (§ 87-1-901, § 87-1-217, MCA). This includes the opportunity to harvest wolves

when populations are robust. Management of classified species is necessary to maintain a stable ecosystem, and thereby, a no-management alternative is impractical and unreasonable. But importantly, FWP is mandated by law to implement legislation regarding the management of wolves (§ 87-1-901 MCA).

Thus, the no-management alternative was dismissed from further, detailed consideration and analysis.

## **2.6 PROPOSED ACTION**

FWP's Preferred Alternative is Alternative 2 – Adoption and implementation of the 2023 Wolf Plan.

# CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

## 3.1 INTRODUCTION

This chapter describes the condition of the affected environment (including its human elements), the resource-specific analysis areas for direct and secondary impacts, the regulatory framework (federal, state, and local laws and regulations) applicable to each resource, and the environmental impacts (direct, secondary, and cumulative) that may result from selection and implementation of the proposed action and alternatives described in **Chapter 2**.

This chapter provides the scientific and analytic basis for the comparison of the proposed action and alternatives as presented in **Chapter 2** of this EIS. Resources analyzed are listed in **Chapter 3.12** and were identified during public and agency scoping. The geographic context for the resource-specific discussions is introduced in **Chapter 3, Section 3.1.3**. Environmental baseline information summarized in this chapter was obtained from the review of published sources, review of unpublished data, communication with government agencies, and review of field studies of the area.

Impacts were analyzed by considering the potential for impacts of an action (direct, secondary, and cumulative) on each of the 19 resources analyzed. FWP based these impact analyses and conclusions on the review of existing literature and studies, information provided by resource specialists or subject matter experts and other agencies, professional judgment, agency staff insights, and public input; resource-specific analysis methodologies are provided in the introductions to each resource section. An overview of impacts on each resource by alternative is presented in **Chapter 3**.

In this EIS, an environmental impact is any change from the present condition of any resource or issue that may result because of implementation of the No Action Alternative (Alternative 1) or the proposed action (Alternative 2). Definitions used to describe impacts are listed below.

### 3.1.1 DEFINITIONS USED FOR IMPACTS ANALYSES

The following terms were used in this EIS to describe the nature of impacts associated with each alternative. These definitions were formulated through the review of existing Administrative Rules of Montana (ARM), laws (such as MEPA), policies, and guidelines, and with assistance from resource specialists.

*Direct, Secondary, and Cumulative Impacts:* As defined by MEPA, impacts can be direct, secondary, or cumulative.

- *Direct impacts* are caused by an action and occur at the same time and place as the action.
- *Secondary impacts* are defined in ARM 12.2.429(18) as “a further impact to the human environment that may be stimulated or induced by or otherwise result from a direct impact of the action.”
- *Cumulative impacts* are defined in ARM 12.2.429(7) as the “collective impacts on the human environment of the proposed action when considered in conjunction with other past and present actions related to the proposed action by location or generic type. Related future

actions must also be considered when these actions are under concurrent consideration by any state agency through pre-impact statement studies, separate impact statement evaluation, or permit processing procedures.”

*Duration:* For this EIS, impact duration is described as short-term or long-term; generally, these are defined as follows (exceptions occur for Cultural and Historic Resources, and Geology and Geochemistry):

- Short-term impact – impacts that would not last longer than the proposed project.
- Long-term impact – impacts that would remain or occur following the proposed project.

Sometimes impact duration is described on a biological timeframe depending on the proposed action and alternatives. These are defined as follows:

- Short-term impact – a change that within a short period would no longer be detectable as the resource is returned to its pre-project condition, appearance, or use. For the purposes of this EIS a “short period” is defined as less than four years which is equal to one wolf generation.
- Long-term impact – a change in a resource or its condition that does not immediately return the resource to its pre-project condition, appearance, or productivity; long-term impacts would apply to changes in condition that continue beyond four years but would be expected to eventually return to pre-project conditions.

Because the described alternatives and proposed action do not have a defined timeframe and would impact the affected environment indefinitely as long as wolves are present on the landscape and managed, the duration of the impacts analysis is specifically undefined but considered “long-term” for all physical environment and human population resources in this document.

*Severity:* For this EIS, the severity of an impact is measured using the following:

- No impact - there would be no change from current conditions.
- Negligible - an adverse or beneficial effect would occur but would be at the lowest levels of detection.
- Minor - the effect would be noticeable but would be relatively small and would not affect the function or integrity of the resource.
- Significant - the effect would irretrievably alter the resource.

*Type:* Impacts can be beneficial or adverse and residual. Beneficial impacts are those that create a positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition. Adverse impacts are those that move the resource away from a desired condition or detract from its appearance or condition.

*Mitigation:* Some impacts may require mitigation. As defined in ARM 12.2.429, mitigation means:

- Avoiding an impact by not taking a certain action or parts of a project;
- Minimizing impacts by limiting the degree or magnitude of a project and its implementation;

- Rectifying an impact by repairing, rehabilitating, or restoring the affected environment; or
- Reducing or eliminating an impact over time by preservation and maintenance operations during the life of a project or the time period thereafter that an impact continues.

Residual impacts are those that are not eliminated by mitigation, as defined in ARM 12.2.429(16).

### 3.1.2 RESOURCES ANALYZED AND CHAPTER ORGANIZATION

According to the applicable requirements of ARM 12.2.436(4)(a), the following 19 resources were identified for detailed assessment in this EIS. Direct, secondary, and cumulative impacts on these resources are disclosed in this chapter.

Terrestrial, Avian, and Aquatic Life and Habitats (Chapter 3.2)
Water Quality, Quantity and Distribution (Chapter 3.3)
Geology, Soil Quality, Stability, and Moisture (Chapter 3.4)
Vegetation Cover, Quantity, and Quality (Chapter 3.5)
Aesthetics (Chapter 3.6)
Air Quality (Chapter 3.7)
Unique, Endangered, Fragile, or Limited Environmental Resources (Chapter 3.8)
Historical and Archaeological Sites (Chapter 3.9)
Energy Use (Chapter 3.10)
Social Structures and Mores (Chapter 3.11)
Cultural Uniqueness and Diversity (Chapter 3.12)
Access to and Quality of Recreational and Wilderness Activities (Chapter 3.13)
Local and State Tax Base and Tax Revenue (Chapter 3.14)
Agricultural, Industrial or Commercial Activity and Production (Chapter 3.15)
Human Health (Chapter 3.16)
Quantity and Distribution of Employment (Chapter 3.17)
Demands for Government Services (Chapter 3.18)
Distribution and Density of Population and Housing (Chapter 3.19)
Locally Adopted Environmental Plans and Goals (Chapter 3.20)

### Regulatory Framework

All 19 resources analyzed follow the same regulatory framework for either considered alternative.

#### Federal Requirements

Wolves are currently under state authority and managed by FWP within the state of Montana. FWP aims to maintain the wolf population above the *minimum* baseline metric established by the USFWS of 15 breeding pairs and 150 individuals, or whatever federal ESA listing criteria if modified. There are no other applicable federal requirements associated with an analyzed resource related to adoption and implementation of either alternative.

If the USFWS decides to relist wolves, the USFWS would become the ultimate authority on wolf management. Day-to-day management may be delegated to FWP. In other words, FWP would continue to monitor wolves in the state of Montana and provisions to address wolf-livestock conflict mitigation would still be present. However, most of the lethal management tools (i.e., wolf harvest regulations and rules) would be removed from applicability under the Plan.

## **State Requirements**

Under the authority of the MCA, the commission can develop administrative rules governing wolf management (ARM). Wolves are classified as a species in need of management in Montana statute (§ 87-5-131, MCA). FWP also has a statutory requirement to manage species to prevent the need for federal listing (§ 87-5-107, MCA). Species or subspecies of wildlife indigenous to this state that may be found to be endangered within the state should be protected in order to maintain and, to the extent possible, enhance their numbers (§ 87-5-103, MCA). Wolf management can be found in Montana statute (§ 87-1-901, MCA). All other statutes and administrative rules regarding wolves can be found in **Chapter 1.4.1**. There are no other applicable state requirements associated with any of the analyzed resources related to adoption and implementation of either alternative.

## **Local Requirements**

Local governments have no authority for state managed wildlife per § 7-1-111, MCA, which prohibits counties from exercising “any power that applies to or affects Title 87.” Title 87 is the fish and wildlife title of the MCA. However, local governments may enact regulations to reduce conflict, such as prohibiting feeding of wildlife. There are no other applicable state requirements associated with any of the analyzed resources related to adoption and implementation of either alternative.

## **Other Related, Past, Present, and Future Actions as They Relate to the Aforementioned Resources**

The following activities have impacted or may impact some or any of the 19 listed resources in the analysis area:

- Agriculture and livestock operations
- Road right-of-way and related construction
- National Park, wilderness, national forest area designations and operations
- Wildland and prescribed fire
- Actions by U.S. Fish and Wildlife Services or other state or federal wildlife managers.
- Litigation. Historic, ongoing, and future federal and state lawsuits and associated court decisions.

Agricultural and livestock development in the area consists mostly of cropland, pastureland, and grazing lands. Historical and ongoing agricultural and livestock development would alter habitat within the analysis area; however, impacts would be consistent with current practices. The proposed action does not include any additional agricultural or livestock production; therefore, the project does not contribute to cumulative impacts associated with agricultural or livestock production.

Road and associated right-of-way construction activities have historically resulted in habitat loss or fragmentation within the analysis area due to land disturbances. These activities would continue under the proposed action, which would contribute to habitat losses and displacement impacts from past and future land disturbance associated with construction of infrastructure. The proposed action does not propose any additional construction disturbance; therefore, the project does not contribute to cumulative impacts associated with road or right-of-way construction. Such projects would typically be planned and implemented by the Montana Department of Transportation (MDOT) and/or affected

federal partners, pursuant to MEPA and the National Environmental Policy Act (NEPA), respectively, and would require additional environmental review prior to project approval.

Federal land managers have jurisdiction over National Parks, wilderness areas, and national forests. Approximately 36% of western Montana is managed by the USFS and just over 2% by the NPS. All, or portions of, the Bitterroot, Custer-Gallatin, Deer Lodge-Beaverhead, Flathead, Helena-Lewis and Clark, Kootenai, Kaniksu (part of the Idaho Panhandle National Forest complex), and Lolo national forests lie within western Montana. These areas are protected from certain activities that could impact *Terrestrial, Avian, and Aquatic Life and Habitats* in the affected areas (Table 4).

Table 4: State and federal protected land acreage within western Montana.

<b>State or Federal Protected Lands</b>	<b>Acres</b>
Bureau of Reclamation (BOR)	84,480
National Forest (USFS)	14,018,560
National Park (NPS)	1,173,920
National Recreation Area (USFS and NPS)	115,200
National Wildlife Refuge (USFWS)	76,804
Bureau of Land Management (BLM)	1,376,640
Wilderness (BLM, USFS, and USFWS)	3,300,480
Wilderness Study Area (BLM and USFS)	807,040
State Parks (FWP)	29,440
State Wildlife Management Areas (FWP)	413,440

Wildland and prescribed fires indirectly influence wolf food resources in various ways. Forbs, grasses, and other undergrowth may respond quickly and immediately thrive in post-fire conditions (Houston 1973, Turner et al. 1999, Wamboldt et al. 2001). Maturing trees and other undergrowth may later shade out these plants. Also, root crops may be negatively or positively influenced by fire; a handful of variables define this. Wolf prey (i.e., ungulate distribution) may be altered following fire events because of changes to the forest and vegetative communities. Wolves themselves have evolved with wildfire, and therefore can move large distances in response to altered habitat. The proposed action does not propose any addition or decrease of wildland or prescribed fire; therefore, the project does not contribute to cumulative impacts associated with wildland or prescribed fire.

The U.S. Fish and Wildlife Service (USFWS) and other federal agencies, as well as wildlife management agencies from other affected states, can take actions that affect wildlife, habitat, and ecology. For example, the USFWS may list another species that may interact with wolves as threatened or endangered under the ESA. In such a case, the state may have to modify its management of the affected species and wolves to accommodate such a listing. These outside actions, however, would almost always require their own separate and distinct review under NEPA. Additionally, affected states like Idaho and Wyoming, which border Montana and include contiguous wolf habitat, like the GYE, may take actions that affect the wolf population in Montana, and vice-versa. Because Montana’s wolf population represents but a segment of the greater NRM wolf population, Montana will also take such actions of other affected states into account when managing wolves to a sustainable population within its borders.

FWP would work with federal land management agencies via the NEPA planning processes, e.g., USFS forest plan revisions and USBLM resource management plans, when recommending conservation action.

FWP would work with private landowners whenever considering additional or new conservation measures on private land. This process would be landowner led. All lands projects between FWP and private landowners are subject to rigorous review and approval processes, including MEPA.

Litigation focused on past, present, and future actions related to wolf management in Montana and all affected states making up the NRM wolf population, has, and will continue to have, the potential to affect how wolves are currently, have been historically, and will be managed in Montana.

FWP would comply with any decisions made by the courts, which impact wolf management in Montana, and would participate, as appropriate, in any ongoing or future litigation on the subject.

### **Unavoidable Adverse Impacts**

Under either alternative, there would be no unavoidable adverse impacts on the 9 physical environment resources (*Terrestrial, Avian, and Aquatic Life and Habitats; Water Quality, Quantity and Distribution; Geology, Soil Quality, Stability, and Moisture; Vegetation Cover, Quantity, and Quality; Aesthetics; Air Quality; Unique, Endangered, Fragile, or Limited Environmental Resources; Historical and Archaeological Sites, Energy*) and 10 human environment resources (*Social Structures and Mores; Cultural Uniqueness and Diversity; Access to and Quality of Recreational and Wilderness Activities; Local and State Tax Base and Tax Revenue; Agricultural, Industrial, or Commercial Activity and Production; Human Health; Quantity and Distribution of Employment; Demands for Government Services; Distribution and Density of Population and Housing, Locally Adopted Environmental Plans and Goals*). Because wolves occur and are managed in their native habitat, there would be no adverse impacts where they occur. Wolves will continue to inhabit the state of Montana in which they are part of the native fauna and will function ecologically as a native inhabitant of that habitat. If, in the future, implementation of the plan resulted in unanticipated adverse impacts, management steps could be taken to address those impacts, such as reduction of the local population creating the adverse impact. Therefore, no residual adverse impacts would be expected because of the proposed action.

### **Irreversible and Irretrievable Impacts**

Under either alternative, there would be no irreversible and/or irretrievable impacts on the 9 physical environment resources (*Terrestrial, Avian, and Aquatic Life and Habitats; Water Quality, Quantity and Distribution; Geology, Soil Quality, Stability, and Moisture; Vegetation Cover, Quantity, and Quality; Aesthetics; Air Quality; Unique, Endangered, Fragile, or Limited Environmental Resources; Historical and Archaeological Sites, Energy*) and 9 human environment resources (*Social Structures and Mores; Cultural Uniqueness and Diversity; Access to and Quality of Recreational and Wilderness Activities; Local and State Tax Base and Tax Revenue; Agricultural, Industrial, or Commercial Activity and Production; Human Health; Quantity and Distribution of Employment; Demands for Government Services; Distribution and Density of Population and Housing, Locally Adopted Environmental Plans and Goals*). A resource commitment is considered irreversible when impacts from its use limit future use options. Irreversible commitments apply primarily to nonrenewable resources, such as fossil fuels or minerals, or to those resources that are renewable only over long timespans, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption of the resource is neither renewable nor recoverable for use by future generations. In essence, irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the proposed action or preferred alternative. Such commitments include expenditure of funds, loss of production, or restrictions on resource use.

The programs considered under either alternative do not result in any irretrievable commitment of resources. Habitat programs, harvest (i.e., hunting/trapping) seasons, wolf-livestock conflict mitigation, and access management can be reversed or revised if needed. Mortality of individual animals will not result in any irretrievable commitment of wolf populations. Because harvest and removals can be regulated or modified on an annual basis, or more frequently (should data indicate that to be prudent), the management program poses no threat to the species.

### **3.1.3 GENERAL SETTING OF THE AFFECTED ENVIRONMENT**

#### **Physical Environment and Human Environment Resources**

The analysis area for direct, secondary, and cumulative impacts on the 9 physical environment resources (*Terrestrial, Avian, and Aquatic Life and Habitats; Water Quality, Quantity and Distribution; Geology, Soil Quality, Stability, and Moisture; Vegetation Cover, Quantity, and Quality; Aesthetics; Air Quality; Unique, Endangered, Fragile, or Limited Environmental Resources; Historical and Archaeological Sites, Energy*) and 10 human environment resources (*Social Structures and Mores; Cultural Uniqueness and Diversity; Access to and Quality of Recreational and Wilderness Activities; Local and State Tax Base and Tax Revenue; Agricultural, Industrial, or Commercial Activity and Production; Human Health; Quantity and Distribution of Employment; Demands for Government Services; Distribution and Density of Population and Housing, Locally Adopted Environmental Plans and Goals*) is the state of Montana (all 56 counties), and constitutes 147,040 mi<sup>2</sup> (380,832 km<sup>2</sup>).

Lower elevation habitats below 6,000 ft. (1,829 m) vary greatly and include large areas of shortgrass/sagebrush prairie, mountain foothills, intensively cultivated areas (grain and hay field agriculture), natural wetlands/lakes, riparian plant communities ranging from narrow streambank zones to extensive cottonwood river bottoms, manmade reservoirs, small communities, and sizeable towns and cities. The mountainous portion above 6,000 ft. (1,829 m) contains 44 mountain ranges, including the Absaroka, Anaconda-Pintler, Beartooth, Beaverhead, Big Belt, Bitterroot, Blacktail, Boulder, Bridger, Cabinet, Castle, Centennial, Coeur d'Alene, Crazy, East Pioneer, Elkhorn, Flathead, Flint Creek, Gallatin, Garnet, Gravelly, Henry Lake, Highland, John Long, Lewis, Lewis and Clark, Little Belt, Livingston, Madison, Mission, Nevada, Ninemile-Reservation Divide, Purcell, Rattlesnake, Ruby, Sapphire, Salish, Sawtooth, Snowcrest, Spanish Peaks, Swan, Tendoy, Tobacco Root, and West Pioneer ranges. Mountainous habitats are dominated by coniferous forest (Douglas fir, lodgepole pine, Engelman spruce, western cedar, hemlock, whitebark pine, limber pine, ponderosa pine, juniper), and rocky subalpine/alpine communities found above timberline.

Western Montana, more commonly occupied by wolves, is characterized by river valleys divided by rugged mountain ranges. Elevations range from 1,820 ft. (555 m) where the Kootenai River enters Idaho near Troy, Montana, to 12,799 ft (3,904 m) on top of Granite Peak in the Beartooth Mountains. Major river drainages in Montana west of the Continental Divide include the Kootenai (which flows into the Columbia River in British Columbia), and the Bitterroot, Blackfoot, and Flathead (all of which flow into the Clark Fork, which itself flows into Lake Pend Oreille in Idaho, and from there into the Columbia River near the Washington/British Columbia boundary). East of the Continental Divide, major drainages in Montana include the Bighorn, Clark's Fork, and Tongue Rivers (all of which flow into the Yellowstone River), and the Beaverhead/Bighole (Jefferson), Gallatin, Judith, Madison, Marias, Musselshell, Sun, and Teton Rivers (all of which flow into the Missouri River). Additionally, the Belly, St. Mary, and Waterton

Rivers, which originate in Glacier National Park, are tributaries of the Saskatchewan River system, ultimately flowing into Hudson Bay.

### Human population

As of 2021, an estimated 1,104,271 people lived in Montana. The 2021 estimate also reflected a population increase of nearly 22% since the year 2000. During the years 2000–2021, population growth was highest in Broadwater, Carbon, Flathead, Garfield, Lincoln, Madison, Mineral, Musselshell, Petroleum, Ravalli, and Sanders counties; population declined modestly in nine counties (Table 5).

Table 5. Montana counties: Population, area, and population density. *From Montana.gov (U.S. Census Bureau 2021). Counties are listed in descending order by 2021 population.*

County	Population, 2000	Population, 2021	Annual growth rate, 2000– 2020	Area in miles (excluding large water bodies)	Population density
Yellowstone	129,570	167,146	1.30%	2,635	63.44
Gallatin	68,375	122,713	2.70%	2,608	47.06
Missoula	96,178	119,533	1.10%	2,598	46.01
Flathead	74,774	108,454	3.50%	5,098	21.27
Cascade	80,318	84,511	0.20%	2,688	31.44
Lewis and Clark	55,886	72,223	1.60%	3,461	20.87
Ravalli	36,301	45,959	3.60%	2,394	19.20
Silver Bow	34,571	35,411	0.70%	718	49.35
Lake	26,588	32,033	2.50%	1,493	21.45
Lincoln	18,818	20,525	4.00%	3,619	5.67
Park	15,710	17,473	1.60%	2,802	6.24
Hill	16,605	16,179	-0.40%	2,895	5.59
Glacier	13,183	13,785	0.30%	2,991	4.61
Sanders	10,287	12,959	4.10%	2,762	4.69
Big Horn	12,669	12,957	-0.70%	4,996	2.59
Jefferson	10,052	12,470	2.80%	1,657	7.53
Custer	11,678	11,916	0.50%	3,783	3.15

Fergus	11,902	11,617	1.40%	4,335	2.68
Richland	9,619	11,283	-1.90%	2,084	5.41
Carbon	9,561	10,847	3.20%	2,047	5.30
Roosevelt	10,623	10,821	0.40%	2,354	4.60
Beaverhead	9,204	9,524	1.60%	5,543	1.72
Deer Lodge	9,409	9,491	0.80%	731	12.98
Stillwater	8,247	9,044	0.40%	1,790	5.05
Madison	6,870	8,917	3.00%	3,587	2.49
Dawson	9,050	8,904	-0.20%	2,373	3.75
Rosebud	9,399	8,124	-2.10%	5,010	1.62
Valley	7,653	7,537	-0.20%	4,919	1.53
Broadwater	4,378	7,288	6.50%	1,189	6.13
Powell	7,203	6,999	0.90%	2,326	3.01
Blaine	6,968	6,980	-0.30%	4,218	1.65
Teton	6,436	6,269	0.40%	2,271	2.76
Pondera	6,384	5,994	1.90%	1,626	3.69
Chouteau	6,062	5,916	0.30%	3,965	1.49
Toole	5,261	5,011	0.90%	1,916	2.61
Musselshell	4,471	4,896	3.10%	1,866	2.62
Mineral	3,877	4,860	6.50%	1,220	3.98
Phillips	4,568	4,192	0.00%	5,123	0.82
Sweet Grass	3,633	3,723	1.40%	1,855	2.01
Sheridan	4,078	3,527	0.30%	1,669	2.11
Granite	2,849	3,344	1.10%	1,727	1.94
Fallon	2,816	3,017	-0.50%	1,620	1.86
Wheatland	2,243	2,059	-1.60%	1,422	1.45
Judith Basin	2,330	2,044	1.30%	1,870	1.09
Meagher	1,916	1,964	2.00%	2,392	0.82

Liberty	2,168	1,946	-0.70%	1,427	1.36
McCone	1,960	1,718	-0.90%	2,641	0.65
Powder River	1,847	1,702	0.50%	3,298	0.52
Daniels	2,005	1,686	1.70%	1,426	1.18
Carter	1,335	1,428	1.10%	3,339	0.43
Garfield	1,268	1,209	3.20%	4,668	0.26
Prairie	1,179	1,091	1.40%	1,736	0.63
Wibaux	1,072	934	0.60%	888	1.05
Golden Valley	1,019	831	1.30%	1,173	0.71
Treasure	854	768	0.90%	979	0.78
Petroleum	493	519	4.20%	1,651	0.31

Although still sparsely populated by national standards, the human population of Western and Central Montana and its associated developmental footprint has expanded greatly in recent decades. In 2018, Montana contained an estimated 344,365 single family homes, with approximately 123,490 built since 1990. Almost 1,324,800 acres (536,128 hectares) of previously open space was estimated to have been converted to residences during this quarter-century. Counties with the largest acreage of open space converted included Gallatin, Madison, Flathead, Lewis and Clark, Park, and Yellowstone (Headwater Economics 2020).

### Economics

From 2017-2021, the median household income in the United States was \$69,021 and the per capita income in the last 12 months was \$37,638. In Montana, the median household income was \$60,560 and the per capita income in the last 12 months was \$34,423, with 11.9% of persons below the poverty line. All but four ranked below the U.S. median household income (Table 6).

Table 6. Montana counties: Income and Poverty. From Montana.gov (U.S. Census Bureau 2021). Counties are listed in descending order of 2021 median household income.

County	Median household income	Poverty rate (%)
Gallatin	\$78,910	9
Stillwater	\$75,820	8
Dawson	\$70,252	11

Yellowstone	\$69,182	11
Jefferson	\$68,128	7
Lewis and Clark	\$67,702	9
Broadwater	\$66,307	9
Flathead	\$65,835	10
Missoula	\$65,682	13
Fallon	\$63,793	9
Richland	\$63,148	9
Carbon	\$62,841	9
Madison	\$62,516	9
Sweet Grass	\$61,454	10
Rosebud	\$61,331	18
Ravalli	\$60,030	10
Teton	\$59,787	13
Park	\$59,113	10
Treasure	\$58,275	12
Cascade	\$57,085	13
Sheridan	\$56,095	12
Valley	\$55,338	12
Custer	\$54,913	13
Fergus	\$54,823	12
Hill	\$54,377	17
Musselshell	\$54,003	16
Beaverhead	\$53,776	13
Phillips	\$53,626	15
Granite	\$52,984	12
Daniels	\$52,852	11
Silver Bow	\$52,495	13

Powder River	\$52,298	11
Carter	\$52,116	13
Wibaux	\$51,924	11
McCone	\$51,881	14
Judith Basin	\$51,392	15
Chouteau	\$51,113	14
Lake	\$50,978	17
Mineral	\$50,327	14
Sanders	\$50,270	15
Garfield	\$49,898	15
Toole	\$49,297	15
Liberty	\$49,277	16
Lincoln	\$48,156	17
Petroleum	\$48,141	13
Pondera	\$47,900	17
Powell	\$47,687	17
Roosevelt	\$47,266	25
Big Horn	\$47,179	26
Blaine	\$46,335	19
Prairie	\$46,328	14
Deer Lodge	\$45,725	15
Meagher	\$45,391	15
Glacier	\$44,777	25
Golden Valley	\$43,820	17
Wheatland	\$42,431	17

---

**Land ownership**

The federal government owns 27,276,820 acres (29.3% of Montana), state government owns 5,196,400 acres (5.6% of Montana), and private entities own 60,682,580 acres. The majority of mountainous habitat (above 6,000 ft., 1,829 m) is located within publicly owned National Forests, corporate timber lands, Glacier National Park, and the Montana portion of Yellowstone National Park. Approximately 36% of Western Montana is managed by USFS, and just over 2% by NPS. National Forests include Bitterroot, Custer-Gallatin, Deer Lodge-Beaverhead, Flathead, Helena-Lewis and Clark, Kootenai, Kaniksu (part of the Idaho Panhandle National Forest complex), and Lolo. The Bureau of Land Management (BLM) manages just under 3% of lands in Western Montana. A small portion (just over 1%) of mountainous habitat is in state ownership (Montana Department of Natural Resources and Conservation [DNRC]). The Blackfeet Indian Reservation constitutes over 3% of total lands, and the Flathead Indian Reservation constitutes an additional 2.6%. Smaller amounts are managed specifically for wildlife by USFWS and FWP. Other lands are in private ownership, including private subdivisions, ranches, land trusts, ski resorts and timber company lands. Communities of various sizes also occupy several thousand acres of low-elevation river-valley habitat.

## Land Use

### Agriculture

Montana supports a large agricultural economy. In 2017, there were an estimated 27,048 farms and ranches. By far the most common activities of these farms and ranches were raising beef cattle, growing forage (hay) for cattle, and growing grain crops (wheat, oats, barley). Sheep, hogs, and dairy cattle were also raised in smaller numbers. County-specific agricultural characteristics can be found at: [https://www.nass.usda.gov/Publications/AgCensus/2017/Online\\_Resources/County\\_Profiles/Montana/index.php](https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Montana/index.php).

Sheep and beef cattle were grazed on privately owned grassland and on publicly owned (USFS, BLM, DNRC) grazing allotments. In 2021, an estimated 2,451,500 cattle (including calves) grazed in Montana, as well as some 287,300 sheep (including lambs). The largest populations of cattle were in Beaverhead (~ 125,000), Fergus (~ 115,000), and Yellowstone (~ 110,000) counties, and the largest number of sheep were in Carter (~ 19,000), Golden Valley (~ 15,300), Stillwater (~ 12,300), and Beaverhead (~ 12,200) counties. Cattle density was highest in Yellowstone, Carbon, and Judith Basin Counties; cattle outnumbered people by the greatest proportion in Carter, Garfield, and Powder River Counties (Table 7).

Table 7. Montana counties: Number and density of cattle, and ratio of cows to people. *From nass.usda.gov/mt (USDA, NASS, Mountain Region 2021). Counties are listed in descending order by 2021 number of cattle.*

County	Number of cattle	Cattle density	Cattle/person
Beaverhead	125,000	22.55	13.12
Fergus	115,000	26.53	9.90
Yellowstone	110,000	41.75	0.66

Carter	89,000	26.65	62.32
Rosebud	89,000	17.77	10.96
Custer	89,000	23.53	7.47
Powder River	83,000	25.17	48.77
Big Horn	82,000	16.41	6.33
Madison	79,000	22.02	8.86
Carbon	77,000	37.61	7.10
Phillips	75,000	14.64	17.89
Garfield	72,000	15.42	59.55
Judith Basin	70,000	37.44	34.25
Blaine	69,000	16.36	9.89
Cascade	63,000	23.44	0.75
Richland	62,000	29.75	5.49
Valley	61,000	12.40	8.09
Meagher	50,000	20.91	25.46
Lake	48,000	32.14	1.50
Prairie	47,000	27.07	43.08
Stillwater	45,500	25.43	5.03
Fallon	45,000	27.79	14.92
Teton	45,000	19.82	7.18
Glacier	43,000	14.38	3.12
Wheatland	41,000	28.83	19.91
Gallatin	40,000	15.34	0.33
McCone	39,500	14.95	22.99
Lewis and Clark	39,000	11.27	0.54
Musselshell	38,000	20.37	7.76
Chouteau	36,500	9.20	6.17
Park	36,000	12.85	2.06

Dawson	35,500	14.96	3.99
Powell	34,500	14.84	4.93
Sweet Grass	32,500	17.52	8.73
Treasure	27,500	28.09	35.81
Roosevelt	26,500	11.26	2.45
Ravalli	26,500	11.07	0.58
Jefferson	24,500	14.78	1.96
Pondera	23,500	14.45	3.92
Broadwater	22,500	18.92	3.09
Petroleum	21,500	13.03	41.43
Wibaux	20,000	22.51	21.41
Granite	18,900	10.94	5.65
Toole	17,800	9.29	3.55
Sheridan	17,300	10.37	4.91
Hill	16,400	5.67	1.01
Golden Valley	16,100	13.73	19.37
Sanders	15,200	5.50	1.17
Daniels	14,000	9.82	8.30
Liberty	10,000	7.01	5.14
Flathead	8,300	1.63	0.08
Deer Lodge	7,200	9.85	0.76
Missoula	5,700	2.19	0.05
Silver Bow	3,600	5.02	0.10
Lincoln	2,100	0.58	0.10
Mineral	400	0.33	0.08

---

## Mining

Large mineral deposits, ranging from talc to gold, are located throughout Montana. Of these, metallic minerals provide the largest share of Montana's non-fuel mining income, with copper, palladium, and platinum leading the list of important metals (the latter two 2 being mined nowhere else in the United States). A breakdown of nonfuel mineral commodities can be found through the USGS National Minerals Information Center (<https://www.usgs.gov/centers/national-minerals-information-center/statistical-summary>). In 2012, there were a total of 53 mines in production, development, standby permitting, or reclamation status, all but 7 of which were located within Western Montana (these 7 were predominantly coal mines; <http://www.mbmgt.mtech.edu/pdf/2012ActiveMines.pdf>).

## **Wood products**

The majority of Montana's forested lands (23 million acres) are located within the western part of the state. Nearly 4 million acres of these forest lands are permanently reserved as either Wilderness Areas or National Parks. Eleven million acres of the remaining forested land is administered by the USFS, with 5.2 million acres of this public estate designated by current forest plans as suitable for timber production. Private forest lands occupy approximately 6 million acres, with 2 million owned and managed by large timber companies. Another four million acres of private forest lands are owned by some 11,000-plus private individuals. Timber production by county can be found through University of Montana's Bureau of Business and Economic Research (<https://www.bber.umt.edu/FIR/HarvestMT.aspx>). In 1988, an estimated 1,163 million board feet (MMBF) were produced from Montana's forestlands; this declined to approximately 352 MMBF in 2009, before recovering slightly to 367 MMBF in 2018.

Sources for wood products, categorized broadly into public (USFS; state and other public), and private (corporate industrial timber lands; private, non-industrial and tribal) forestlands, has varied over time (Figure 21). During the 1980s, most production came from U.S. Forest Service lands, being almost matched by private industrial forests, with very little coming from state lands. As production on USFS lands declined in the 1990s, the proportion coming from non-industrial and tribal lands increased (briefly becoming dominant in 1994). The relative contribution from private industrial lands peaks in about 1998 as USFS lands continued to decline, but other public lands made up some of that. However, the proportion contributed by private industrial lands has declined markedly in the past 20 years, with the other sources increasing in importance.

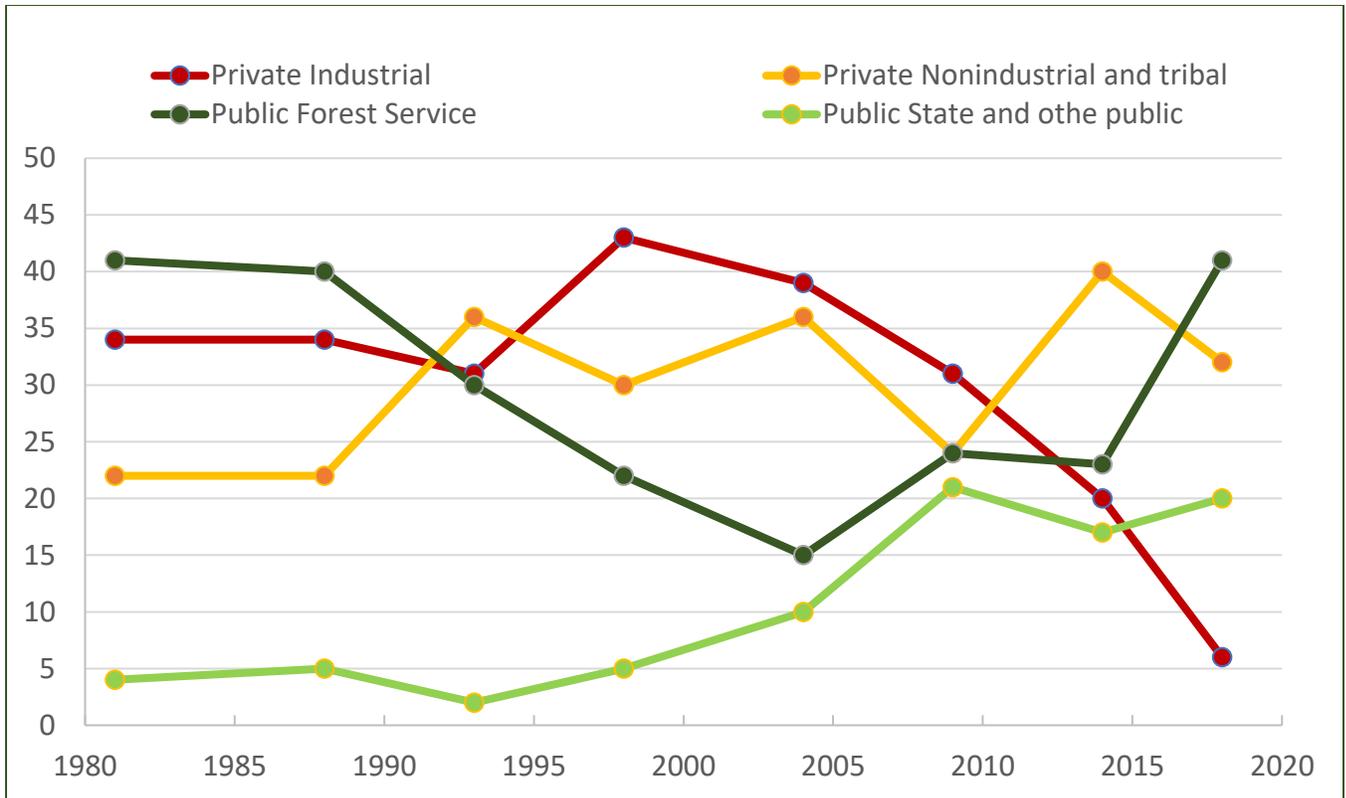


Figure 21. Percentage of wood products from four categories of forest producing lands. *Data (1985–2020) from University of Montana Bureau of Business and Economic Research (BBER) 2020, <http://www.bber.umt.edu/pubs/forest/fidacs/MT2018%20Tables.pdf>.*

In 2018, the University of Montana Bureau of Business and Economic Research (BBER) estimated that Montana’s forest industry accounted for just under 8,000 jobs in direct employment, and an additional 13,300 jobs indirectly associated with wood products.

### Recreation

Outdoor recreation and tourism are major components of Montana’s economy, which is nationally- and world-renowned for its high-quality fishing, hunting/trapping, camping, hiking, river floating, skiing, snowmobiling, wildlife viewing and sightseeing opportunities. Glacier and Yellowstone National Parks, Flathead Lake, and other public lands attract large numbers of people to the area every year. Many of these outdoor activities are made possible by public ownership of large tracts of mountainous habitat and additional access provided by many private landowners. Recreationists have largely unhindered access to millions of acres of undeveloped land. Quantifying recreation can be difficult because documentation (e.g., permitting or licensing) is not procedurally uniform for consumptive and non-consumptive types of recreation, and therefore cannot be compared. Impacts of wolf management can be beneficial or adverse, minor or significant depending on a particular individual’s beliefs and values in regard to the specific recreation (consumptive or non-consumptive).

### Values associated with wolves: benefits and challenges of wolf presence in Montana

Although largely rural (only the Billings and Missoula areas are considered “metropolitan” by the U.S. Census Bureau) and more ethnically homogenous (88.6% white, 6.4% Native American) and older than most states (23.2% 62 years or older), Montana contains a population with a diversity of values and attitudes toward wildlife. Based on a large-scale public opinion survey in 19 western states conducted in 2004, Teel and Manfredo (2009) developed a typology of value orientations they termed “traditionalists,” “mutualists,” “pluralists,” and “distanced.” “Traditionalists,” also known as “utilitarian,” scored high on measures valuing use of animals and hunting, and tended to emphasize that wildlife should be used and managed for the benefit of people. “Mutualists” scored higher on measures such as social affiliation and caring and tended to view wildlife as part of their extended social network. “Pluralists” scored high on both sets of measures, with context and situations controlling which might dominate in any given issue. Those categorized as “distanced” scored low on both sets of measures, and thus were more apathetic generally about wildlife.

A nationwide survey conducted in 2004 found that Montana had a greater percentage of respondents categorized as “traditionalists” than the national average (47.4%; Teel et al. 2005), which was similar to the 44.6% estimated using similar methodology in 2017 (Lewis et al. 2018). Montana also had a similar percentage of respondents categorized as “mutualists” than the national average (18.9%; Teel et al. 2005), which was similar to the 17.5% estimated using similar methodology in 2017 (Lewis et al. 2018). Manfredo et al. (2018) found the percentage of respondents to be down considerably for “traditionalists” (38.9%) and up considerably for “mutualists” (24.7%), although the methodologies employed were different, making direct comparisons difficult. Montana had among the highest percentage among the 19 western states categorized as “pluralists” (27.0-31.0%), almost unchanged from 2004. Montana had among the lowest percentage of respondents among western states categorized as “distanced” (6.7-7.7%). In short, Montanans don’t all share the same value orientation toward wildlife, but very few are apathetic (Teel et al. 2005, Lewis et al. 2018, Manfredo et al. 2018). Manfredo et al. (2018) also found that, among all 50 states, only Alaska (62.9%) and Wyoming (62.1%) exceeded Montana’s 60.8% of respondents agreeing that local communities should have more control than they currently do over management of fish and wildlife by the state. Montana was among 5 states with the highest percentage of respondents agreeing that wolves that kill livestock should be lethally removed by state managers (Manfredo et al. 2018). FWP licensing data shows that in any 5-year period, 55% of eligible Montanans hold a hunting or fishing license. Thirty-seven percent of Montana respondents reported being active wildlife viewers, a percentage exceeded only by the 40.7% in Alaska. Montana, Alaska, and Wyoming stood apart as states with high percentages of active wildlife viewers while also having high percentages of “traditionalists” (who might otherwise be assumed to hunt wildlife but not watch it; Manfredo et al. 2018).

Generally, attitudes towards wolves are based on experience with or proximity to wolves (Williams et al. 2002, Karlsson and Sjostrom 2007, Houston et al. 2010, Eriksson and Ericsson 2015), diversity of values and beliefs (i.e., the right for wolves to exist and corresponding emotional responses; Bright and Manfredo 1996, Slagle et al 2012), and demographics (i.e., attitudes are often correlated with age, income, and urban or rural residence; George et al. 2016). Most world-wide studies have documented positive attitudes towards wolves and wolf reintroduction efforts in the last half century (Williams et al. 2002), as well as in more recent years (Niemiec et al. 2020). Visitors to YNP enjoy viewing wolves among other wildlife and scenery (USFWS 1994a). However, associating visitation exclusively with wolf-viewing is near impossible. Wolves were reported as “extremely important” or “very important” for 23-53% of

respondent visitors to groups o YNP (National Park Service 2016), and 44% of visitors listed wolves as one of the top three species they would more like to see (Duffield et al. 2006). Additionally, 62% of respondents in a national survey indicated that they were satisfied just knowing that wolves would be present in YNP (Duffield et al. 1993). Additionally, civilians and recreationalists have embedded values regarding wolves on the landscape as wolf management indirectly impacts their livelihoods (i.e., ecotourism; Duffield et al. 2006) and experiences respectively. Most negative impacts (e.g., safety of pets, loss of big game hunting opportunities, personal safety, and wolf-livestock conflicts) can be more easily quantified than subjective matters such as values and beliefs, and thereby are at times more often displayed in media coverage (Niemic et al. 2020).

As a result, there is a large amount of contention surrounding the polarized perspectives of stakeholders. FWP has conducted regular surveys as part of human dimensions research specific to wolves and will continue to do so in systematic installments. In Montana, tolerance for wolves remains relatively low but has increased slightly (Figure 22; Lewis et al. 2018), echoing other studies in other locations that documented significant increases in positive attitudes associated with wolves (Williams et al. 2002, George et al. 2016). Although most Montanans support wolf hunting (with 47-88% of respondents stated they were very tolerant), there were varied opinions on trapping. For example, 50-63 percent of the respondents for the landowner, wolf license holder, and deer/elk holder surveys think the trapping season is not long enough while 42 percent of the respondents to the household survey think the trapping season is too long. Further, there was little agreement among Montana respondents regarding the sufficiency of harvest regulations, though responses toward FWP's ability to manage wolves were favorable. Respondents of the Montana Household Survey tended to be more dissatisfied, and intolerant of trapping and harvest regulations compared to resident private landowners, resident wolf license holders, and resident deer or elk license holders (Lewis et al. 2018). Other states have found a similar discrepancy between user groups; livestock producers and hunters and trappers more often support wolf harvest seasons and lethal management strategies to address wolf-related conflict compared to the general public, and the average demographics and experiences of these user groups likely play a role on their values and beliefs as well as trust in state government agencies. Despite diverse views toward harvest seasons and management strategies, survey results indicate widespread public misunderstanding and lack of knowledge about wolf population status, management strategies, and harvest regulations (Duda et al. 2019, Schroeder et al. 2020, Bradshaw et al. 2022, Riley et al. 2022).

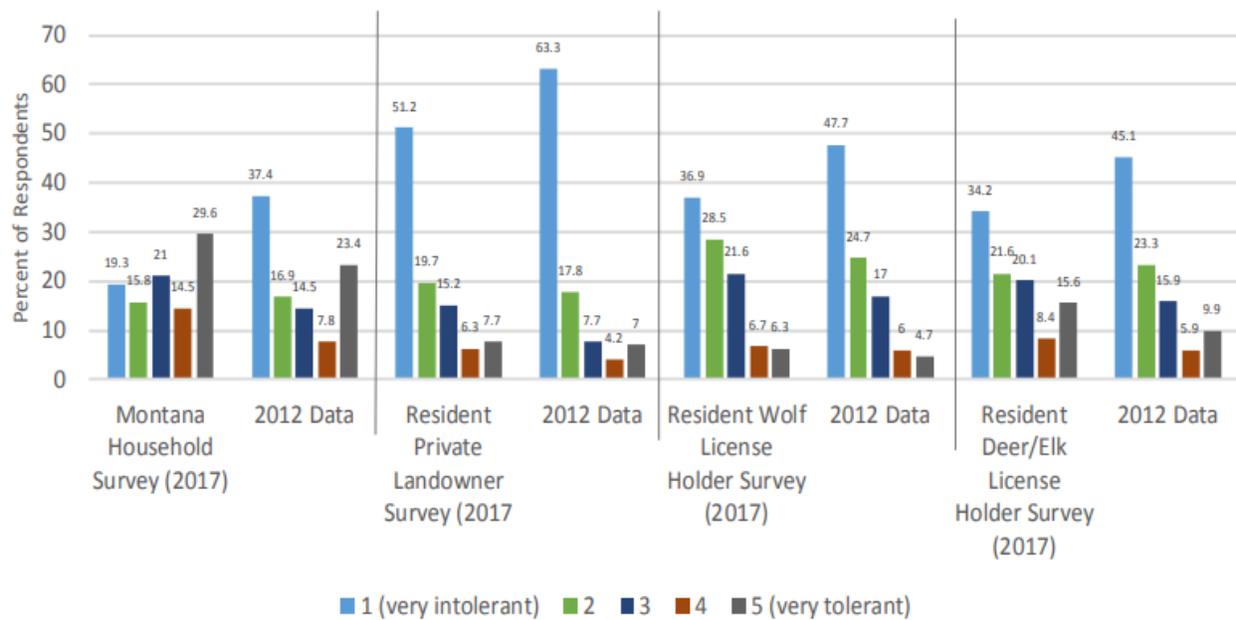


Figure 22. Response to...“On a scale from 1 (very intolerant) to 5 (very tolerant), how tolerant are you with wolves being on the Montana landscape?” Note: The general Montana household survey included a diverse array of Montanans (including private landowners, hunters, and non-hunters). The resident private landowner, resident wolf license holder, and resident deer or elk license holder surveys focused on specific subsets of Montanans (Lewis et al. 2018).

### *Biological benefits and challenges*

Predators such as wolves are influential to the integrity of many ecosystems (Estes 1996), though ecological communities persist without apex predators. Interactions between top-level carnivores and prey species through evolutionary time has shaped and fine-tuned each one morphologically and behaviorally into what they are today. In the absence of those functional relationships, ecological systems may not be balanced (Fritts et al. 1994). Several ecological benefits and challenges of top-level carnivores are described in depth in **Chapter 1, Section 1.2.1**. Wolves provide carrion for other species, cull sick or weak animals, and indirectly influences other flora and fauna. Wolves may also directly influence population dynamics of ungulates.

Today, wolf-prey relationships are influenced by many factors, including habitat modification by humans, land management activities, changes in prey species distribution and numbers, economics, and social and political factors, all of which, in and of themselves, are highly dynamic. Predator-prey relationships have been studied extensively; yet the results of each study are most closely tied to the study area and the conditions prevailing at the time the research was conducted (e.g., predator species present, predator density, prey species present, prey density, winter severity). Predator and prey populations are expected to fluctuate and change through time due to a variety of compounding factors. Despite technological and quantitative advances, our ability to understand population dynamics and predict how predator and prey populations respond to management activities will always contain some degree of uncertainty due to the complex nature of interspecific interactions and relationships wildlife have with their environment.

Broader habitat management and conservation purposes are also served by the presence of large carnivores (Fritts et al. 1994). Providing and sustaining an adequate prey base for wolves requires that ungulates and their habitats be carefully managed, which ultimately benefits entire plant and animal communities. Because wolves and their prey have large home ranges, attention should be focused on the habitat values of both public and private lands. Voluntary habitat conservation efforts, such as land or vegetation management plans and conservation easements will ultimately benefit many wildlife species.

### *Social benefits and challenges*

The social, cultural, and aesthetic values people hold toward wolves today grow out of a long and colorful history of interactions between wolves and humans. Early Native Americans shared the landscape with wolves prior to human expansion, which ultimately led to their attainment of cultural significance. In the days of European settlement and for decades thereafter, settlers viewed wolves unfavorably because they killed livestock during a period of dramatic declines in native prey populations. Wolves were also perceived as a negative, controlling influence on prey populations. However, public opinion about predators, wolves in particular, evolved through the 1960s and 1970s. Wolves came to symbolize changing attitudes about wildlife, the environment, and public lands. With the passage of the ESA and similar laws in the US, changing attitudes were institutionalized. Increasingly, the national public embraced the wolf as a symbol of wilderness and the call to save imperiled species. Wolves symbolize the diversity of American thought, values, and opinions, coming full circle from persecution and extirpation to recovered sustainable populations. Yet, there remains a great diversity in the social, cultural, and aesthetic values that Montanans assign to wolves, as described in detail in the Values associated with Wolves in Montana section of this plan.

The greatest challenges of wolf management come from social and political issues rather than biological issues. Active management of wolf densities and distributions is necessary given their reproductive potential and dispersal capabilities, and it is unrealistic to expect that wolves could exist in 21st century settings as they did in at the time of Lewis and Clark. Management, including lethal removal, is necessary to address and reduce conflicts with livestock and humans, which are more prevalent on the landscape than ever before (Mech 1995, Mech 2001). However, the same public sentiments that promoted wolf recovery and protection often oppose management and lethal removal of wolves (Mech 1995). This dichotomy has led many wolf experts to emphasize the need for a balanced public outreach program that incorporates wolf control as a part of any wolf restoration program (Fritts et al. 1995).

Some livestock organizations and hunting advocates in the northern Rockies spoke out against wolf recovery and restoration efforts in the GYA and central Idaho, as well as against the legal protections afforded wolves by the ESA (USFWS 1994b). Opposition stemmed from concerns about wolf depredations on livestock and the associated economic losses, loss of management flexibility by federal land management agencies, land-use restrictions, human safety, impacts to big game populations, and reduced hunting opportunity. Despite many legal challenges, wolves were released in 1995. The USFWS worked to increase the tolerance and acceptance of wolves by those who expressed the greatest opposition or who would be affected the most by wolf presence. Resolution of wolf-livestock conflicts in a safe, efficient manner is still a federal and state priority.

Montana will continue to face similar challenges and polarization of opinions on the presence of wolves. With a dispersed rural population, an urban population concentrated in a few populous counties, an

economy in which agriculture ranks among the top 3 industries, ecotourism, and expanses of public land that support wolves, the spectrum of human values and attitudes about wolves ranges from total protection of the species to total elimination. These values are highlighted by urban and rural differences, by differences between state residents and the national public, and by differences in the knowledge and understanding of wolf biology and the education of individual respondents (USFWS 1994a, George et al. 2016, Duda et al. 2019, Schroeder et al. 2020, Bradshaw et al. 2022, Riley et al. 2022). These differences in values, attitudes, and opinions create a challenging environment in which to manage a controversial species, such as wolves.

### *Economic benefits and challenges*

Wildlife in Montana has contributed to increased tourist interest and visitation to the state. Visitors rated mountains, Glacier and Yellowstone national parks, rivers, open space, and wildlife as the top six attractions to the state, respectively (Parrish et al. 1997, Dillion and Nickerson 2000). In 2017, nonresident visitors to Montana spent \$3.36 billion, supported 53,380 jobs and contributed to 58% of all dollars in the state. Montana ranks second of western US states in visitor spending per capita, with the travel industry focused in the western half of the state and 40% of vacationers participating in wildlife viewing (Nickerson et al. 2019). Since the reintroduction of wolves, the visitation to YNP has increased an estimated 3.7% due to wolf presence specifically. Wolf centric ecotourism has brought an estimated \$35.5 million (confidence interval of \$22.4 to \$48.6 million) additional tourism dollars into the local economies in the GYA (Duffield et al. 2006). Wildlife-viewing is associated with an influx of cash and sales amounts during the third quarter of the year in western Montana, with spending predominately in retail and grocery (41%) and tourism (e.g., restaurants and lodging, 34%; Montana Dept. of Commerce 2021). However, these quantifications are not wolf-specific. The 2010 mean per capita income for Montana cities in the GYA ranged from \$17,810-\$31,618 (Gardiner, West Yellowstone, Red Lodge, and Cooke City; 2010 Demographic Profile Data, US Census Bureau 2010). Although ecotourism is touted as a viable, sustainable way of generating economic activity through “low-impact” use of natural resources, ecotourism has potentially negative consequences. Risks to resources include increased infrastructure development, habitat degradation, wildlife disturbance, and an erroneous perception that ecotourism leads to long-term protection of environmental assets (Isaacs 2000). Positive economic benefits are expected for businesses related to tourism, outdoor recreation, and national park visitation.

In contrast to the benefits wolves provide for the ecotourism industry, other segments of the economy are adversely affected by wolves. Livestock producers may experience significant direct and or indirect economic impacts due to wolf presence or depredation. In the most recent published report, the percentage of calf deaths attributed to predators increased steadily from 3.5% in 1995 to 11.1% in 2015. In Montana, total cattle and calf losses cost about \$55,135,000, with injuries due to predators costing an additional \$223,000. However, only 2.0% of cattle deaths and 9.8% of calf deaths were due to predators, with 10.2% and 12.8%, respectively, of those depredations attributed to wolves (USDA 2015). Losses due to predators amounted to 5% of the 2020 sheep and lamb supply and 47.2% of all sheep and lamb deaths, costing about \$3.57 million in losses, though coyotes are the primary culprit of sheep depredations (Sommer 2021). From 1987–2003, livestock producers in the NRM that experienced wolf-livestock depredations averaged \$11,076.49 per year in losses (Muhly and Musiani 2009). Specific wolf-livestock depredation statistics and compensation can be found in **Chapter 2.4.1** of this document. Producers could have other losses beyond what is confirmed and documented, and it is difficult to estimate economic losses due to unconfirmed or undocumented livestock losses or the indirect

economic costs associated with wolf presence. Indirect financial expenses of wolf presence may include non-lethal predator control, increased human resources to prevent predator conflicts, and stress-induced declines in livestock health and weight gain as a result of harassment by wolves. For hunting-related businesses such as outfitting, economic losses may be associated with decreased hunter opportunity (i.e., reduced tags) or fewer recreational days afield (i.e., shorter seasons), which ultimately may reduce hunter expenditures or participation rates. Declines in predicted annual big game hunter spending associated with ungulate declines and restrictive harvest opportunities, was estimated to be \$187,000 to \$464,000, with Wyoming estimating a reduced hunter spending of about \$2.9 million (Duffield et al. 2006). Hunter opportunity may fluctuate based on prey densities and distributions as they relate to population objectives. As a result, the license dollars and revenue that funds wildlife and habitat management efforts, may be negatively impacted.

### **3.1.4. ACTIONS CONSIDERED IN CUMULATIVE IMPACTS ANALYSES**

MEPA requires an analysis of cumulative impacts, which are defined as “the collective impacts on the human environment of the proposed action when considered in conjunction with other past and present actions related to the proposed action by location or generic type. Related future actions must also be considered when these actions are under concurrent consideration by any state agency through preimpact statement studies, separate impact statement evaluation, or permit-processing procedures” as set forth in the ARM 12.2.429(7).

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers as well as past, present, and future litigation related to wolf management. The sections below identify past, present, and related future actions. Actions considered in these analyses were identified by FWP, other subject matter experts, as well as public scoping. Past and present actions are accounted for as part of the existing, or “baseline,” environmental conditions. MEPA is forward-looking, with analyses focused on the potential impacts of the proposed action that FWP is considering. The type and timing of impact for the proposed action are key to the cumulative impacts analyses. To be considered for cumulative impacts, prior, present, and future actions must affect the environment in a similar manner and at a similar time as the proposed action and alternatives.

#### **Related Past, Present, and Future Actions**

The following is a summary of past and present actions for which the proposed action has the potential to contribute to cumulative impacts. A discussion of past and present actions is included in the cumulative impacts analysis for each resource.

The wolf was extirpated from the western United States during the 1900s, primarily due to loss of habitat, conflicts with people, and widespread persecution. Although wolf packs were eliminated from Montana by the 1930s, tracks, scat, and or observations of large wolf-like canids were reported or killed up until the 1970s. Most are thought to have been dispersers from Canada and little to no successful breeding activity was identified or sustained consistently through time. The USFWS listed the northern Rocky Mountain gray wolf as endangered under the ESA in 1973.

Wolf recovery in Montana began in the early 1980s via natural immigration from Canada. In 1995 and 1996 wolves were reintroduced into central Idaho and Yellowstone National Park by the USFWS. Wolves

were not released within Montana, but wolf populations in YNP and central Idaho grew rapidly and soon became a source of dispersers to Montana via natural emigration. New packs formed outside the earliest core wolf areas and overall wolf distribution expanded. Wolf dispersal has been documented between and among populations in the Northern Rocky Mountains (NRM) including those in Montana, Idaho and Wyoming. From 1974–2011 (with a gap in 2009 when wolves were first briefly delisted), the USFWS has managed wolves in the US, under the authority of the ESA, as either “endangered” or “experimental, nonessential.” The federal wolf recovery goal of 30 breeding pairs for 3 consecutive years in the NRM of Montana, Idaho and Wyoming (i.e., 10 breeding pairs and 100 individuals in each recovery area: NW Montana, central Idaho, and Greater Yellowstone) and all other necessary criteria for delisting were met by 2002.

Aided by the work of a citizen advisory council, FWP released the Montana Wolf Conservation and Management Planning Document in 2002 and pursued public scoping according to the requirements of MEPA. This public process involved the mailing of 1,000 postcards and 12 community work sessions across the state, and 6,700 written or electronic comments were received. The advisory council and the commission reviewed a summary of public comments, from which FWP drafted the 2003 Wolf Plan and EIS. As a requirement of delisting under the ESA, the state of Montana, along with Idaho and Wyoming, were required to develop state management plans. The goal of each management plan was to ensure that regulatory mechanisms were in place to ensure each state would maintain a recovered population of wolves. The EIS prepared for the 2003 Wolf Plan analyzed five alternatives representing the public’s values, opinions, and beliefs.

After another extensive 60-day public comment period, involving 14 community work sessions and 5,500 written and electronic comments received, *Alternative 2 – Updated Council* was selected to guide FWP’s conservation and management efforts to maintain a recovered population and integrate wolves into Montana’s wildlife management programs upon federal delisting of the species from the ESA. This preferred alternative (proposed action) described a spectrum of management activities that would maintain viable populations of wolves and their prey, resolve wolf-livestock conflicts, and assure human safety. *Alternative 2- Updated Council* also mirrored public comments calling on FWP to seek common ground between wolf advocates and others most directly affected by wolf presence, such as livestock ranchers and hunters. Further, *Alternative 2 – Updated Council* described a wolf program based on principles of adaptive management. These principles of adaptive management were consistent with modern wildlife management practices used for other managed wildlife species where the strategies implemented would be driven by the status of the wolf population and incorporate public outreach, conservation education, law enforcement, and landowner relations. Importantly, regulated wolf harvest “would take place within the larger context of multi-species management programs, would be biologically sustainable, would not compromise the investments made to recover the wolf population... and should advance overall conservation goals by building social tolerance, interest in, and value for the species among those who would otherwise view wolf recovery as detrimental to their ungulate hunting experiences.”

The USFWS approved Montana’s 2003 Wolf Plan but delayed federal delisting due to concerns with Wyoming’s management plan. Anticipating this delay, FWP developed a contingency alternative to provide Montana with more direct involvement in day-to-day monitoring and management of wolves (excluding harvest) while the species remained federally ESA-listed and under ultimate authority of the USFWS. With an amended record of decision in 2004, the contingency alternative was implemented. By

the end of 2004, there were an estimated 835 wolves and 66 breeding pairs in the tri-state area of Wyoming, Idaho, and Montana. In Montana, there were about 153 wolves in 15 breeding pairs at that time. From the time recovery goals were met to delisting, the wolf population in the NRM tripled. The NRM population segment of wolves was first delisted in 2009. In this brief delisting, the delisting rule claimed that the carrying capacity of the NRM wolf population was likely around 1,500 wolves, and wolves “will be managed by the states, National Park Service, and Service [USFWS] to average over 1,100 wolves, fluctuating around 400 wolves in Montana, 500 in Idaho, and 200 to 300 in Wyoming...maintaining the NRM gray wolf population at or above 1,500 wolves in currently occupied areas would slowly reduce wild prey abundance in suitable wolf habitat. This would result in a gradual decline in the number of wolves that could be supported in suitable habitat. Higher rates of livestock depredation in these and surrounding areas would follow. This too would reduce the wolf population because problem wolves are typically controlled,” (USFWS 2009).

In 2010, NRM wolves were re-listed on the ESA because Wyoming lacked an approved state plan and laws. Subsequently, the NRM population segment of wolves in Montana and Idaho was congressionally delisted in May 2011. Wolves in Montana have been managed under state authority as a “species in need of management” since that time (annual reporting to the USFWS was required as part of the post-delisting monitoring plan from 2011–2016). Therefore, wolf management in Montana has been guided by Alternative 2 – Updated Council, which constitutes the 2003 Wolf Plan. While the federal register set a benchmark of a minimum of 150 wolves and 15 breeding pairs, the 2003 Wolf Plan set at benchmark of a minimum of 10 breeding pairs and described a transition from liberal to conservative management if the wolf population declined below 15 breeding pairs. The 2003 Wolf Plan also established an incremental approach to wolf management that allows the legislature and the Commission latitude to adjust wolf numbers and distribution and allows for a regulated harvest of wolves as a wildlife management tool. Implementation of the 2003 Wolf Plan has been ongoing since delisting and, using a combination of sportsman license dollars and federal Pittman-Robertson funds (excise tax on firearms, ammunition, and hunting and trapping equipment), FWP has monitored the wolf population (i.e., distribution and abundance), mitigated conflict including livestock depredation and other problem wolf control, coordinated and authorized research, conducted public outreach, and developed and used contemporary population estimation tools. FWP has managed harvest consistent with state law and Commission regulation (i.e., hunting and trapping seasons) since wolves were delisted from the ESA in 2011. Montana maintained an estimated population of 1,113 to 1,254 wolves from 2012–2020, with a harvest of 166 to 327 wolves annually without demonstrable negative effect on population viability. Annual population and harvest metrics can be found in the annual reports produced by the Montana Gray Wolf Program ([fwp.mt.gov/conservation/wildlife-management/wolf](http://fwp.mt.gov/conservation/wildlife-management/wolf)).

Because wolves are currently under state authority, state laws are the primary regulatory and legal mechanisms guiding management. Two Titles within Montana statute (MCA) describe the legal status and management framework for wolves. Title 87, MCA, pertains to fish and wildlife species and oversight by FWP. Title 81, MCA, pertains to the Montana Department of Livestock (MDOL) and their responsibilities related to predator control. In 2001, the Montana Legislature passed SB163, which amended several statutes in both Titles. Governor Martz signed SB163 on April 21, 2001. Provisions in § 81-7-101 to § 81-7-104 (SB163), MCA, automatically removed wolves from the state endangered species list, concurrent with federal action concluding that wolves are no longer endangered. This action

removed their designation as “predatory in nature”, thereby assuring that resolution of wolf-livestock conflicts used the management strategies described in the 2003 Wolf Plan.

Wolves are currently classified as a species “in need of management” (§ 87-5-131, MCA). This designation could change through legislative or commission action. Regardless of classification as a species in need of management, game animal, or furbearer, FWP will use available tools to manage populations in accordance with the regulatory framework that the legislature and Commission have established.

States have almost sole authority over wildlife management, except for federal protected species (e.g., migratory birds or ESA listings), reserved federal lands (e.g., national parks), or Native American treaty rights. This means that most wildlife species are managed by FWP. As such, many species have specific management plans, similar to the proposed action. Implementation of preferred alternative (i.e., 2023 Wolf Plan) would have cumulative impacts on the management of other species because these species share the landscape and often interact with one another. The Montana Grizzly Management Plan and EIS (2023), Elk Management Plan and EA (2023), Mule Deer Adaptive Harvest Management Plan (2021), Mountain Lion Monitoring and Management Strategy (2019), and State Wildlife Action Plan (2015) are just some examples of wildlife management guidelines that are relevant to wolf management. Species-specific management information (<https://fwp.mt.gov/conservation/wildlife-management>) can be found on the FWP website.

Finally, litigation focused on past, present, and future actions related to wolf management in Montana and all affected states making up the NRM wolf population, has, and will continue to have, the potential to affect how wolves are currently, have been historically, and will be managed in Montana.

## **Actions by Federal Land Management and Other Affected State Agencies**

### **U.S. Department of Agriculture – Forest Service**

The majority of mountainous habitat (above 6,000 ft., 1,829 m) is located within publicly owned national forests, corporate timber lands, and Glacier and (the Montana portion of) Yellowstone National Parks. Approximately 36% of western Montana is managed by USFS, and just over 2% by NPS including all, or portions of, Bitterroot, Custer-Gallatin, Deer Lodge-Beaverhead, Flathead, Helena-Lewis and Clark, Kootenai, Kaniksu (part of the Idaho Panhandle National Forest complex), and Lolo national forests. The USFS regularly conducts habitat projects and management efforts geared toward benefiting wildlife communities, including those that contain wolves. These actions would continue under both alternatives considered, so no additional cumulative impacts would be expected because of adoption and implementation of the 2023 Wolf Plan.

### **U.S. Department of Interior – National Park Service**

The majority of mountainous habitat (above 6,000 ft., 1,829 m) is located within publicly owned national forests, corporate timber lands, and Glacier and (the Montana portion of) Yellowstone National Parks. Approximately 36% of western Montana is managed by USFS, and just over 2% by NPS. Since 1995, the Yellowstone Wolf Project has produced annual reports (<https://www.nps.gov/yell/learn/nature/wolf-reports.htm>). Glacier National Park does not produce annual reports, but also monitors wolf populations. These actions will continue under both alternatives considered, so no additional cumulative impacts are expected because of adoption and implementation of the 2023 Wolf Plan.

## **U.S. Department of Interior – U.S. Fish & Wildlife Service**

The NRM population segment of wolves was delisted (from the ESA) in May 2011 and has been managed under state authority as a “species in need of management” since that time. In other words, the USFWS does not have wolf management authority in the state of Montana. Information on the delisting of wolves can be found on the USFWS gray wolf webpage (<https://www.fws.gov/species/gray-wolf-canis-lupus>). However, FWP will continue to collaborate with the USFWS on a regular basis regarding effective wolf monitoring and management that ensures population viability and longevity in the NRM. Specifically, the modified *minimum* baseline objective stated in the FWP 2023 Wolf Plan corresponds to, and is associated with, the *minimum* baseline metric of 15 breeding pairs, or another stated minimum threshold if modified, as mandated by the USFWS to avoid relisting of wolves under the ESA. Coordination with the USFWS will continue under both alternatives considered, so no additional cumulative impacts would be expected because of adoption and implementation of the 2023 Wolf Plan.

### **State(s) of Idaho and Wyoming**

The NRM wolf population occurs within portions of the states of Montana, Idaho, and Wyoming. Neither Idaho nor Wyoming has wolf management authority in the state of Montana. However, any actions related to wolf management that occur in Idaho and/or Wyoming would impact the overall NRM wolf population and thus would have the potential to affect the management of wolves in Montana. Therefore, FWP will continue to monitor wolf management outside Montana.

### **Related Future Actions**

Under ARM 12.2.429(7), related future actions must also be considered in a cumulative impacts analysis when those actions are under concurrent consideration by any state agency through preimpact statement studies, separate impact statement evaluation, or permit processing procedures. There are no known related future actions as defined in ARM 12.2.429(7) associated with adoption and implementation of the statewide wolf management plan that will impact key issues analyzed below.

## **3.2 PHYSICAL ENVIRONMENT RESOURCE 1: TERRESTRIAL, AVIAN, AND AQUATIC LIFE AND HABITATS**

### **3.2.1 INTRODUCTION**

This section provides an overview of the *Terrestrial, Avian, and Aquatic Life and Habitats* within the analysis area and the governing regulatory authorities.

Wolf management impacts *Terrestrial, Avian, and Aquatic Life and Habitats* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Terrestrial, Avian, and Aquatic Life and Habitats* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Terrestrial, Avian, and Aquatic Life and Habitats* is described above in **Chapter 3, Section 3.1.3**.

## **3.2.2 ENVIRONMENTAL CONSEQUENCES**

### **3.2.2.1 Alternative 1 – No Action**

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed action would therefore impact *Terrestrial, Avian, and Aquatic Life and Habitats*. Wolves will continue to inhabit the analysis area and will have no new or additional impacts on *Terrestrial, Avian, and Aquatic Life and Habitats* where they occur. The No Action Alternative would not change the status of the existing area. Status quo impacts on *Terrestrial, Avian, and Aquatic Life and Habitats* due to current and future management activities in the affected area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

FWP would expect wolves to remain above federal recovery criteria under the No Action alternative. The benchmark of a *minimum* of 15 breeding pairs or 450 wolves (or another stated minimum threshold

if modified, consistent with the USFWS benchmark for recovery) would be maintained and FWP would continue to use regulated harvest as a wildlife management tool. Under the *No Action Alternative*, wolf management would not change relative to the current situation. With ESA delisting of wolves, authority of wolf management was given to the state (2011), thereby FWP would continue to manage wolves in Montana under the No Action alternative and according to the 2003 Wolf Plan.

Wolf management can have positive secondary and cumulative impacts to *Terrestrial, Avian, and Aquatic Life and Habitats* because habitat suitable for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Continued focus on habitat management and conflict prevention actions, as described in the 2003 Wolf Plan, would result in positive secondary and cumulative impacts to other game or predator populations due to overlap with their respective conservation and management issues. Habitat conditions compatible with long-term population stability for many affected fish and wildlife species inhabiting the same locations as wolves would be maintained under the No Action alternative.

### **3.2.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no direct impacts on *Terrestrial, Avian, and Aquatic Life and Habitats*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Terrestrial, Avian, and Aquatic Life and Habitats* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., 2003 Wolf Plan) except the proposed action would incorporate current science as it becomes available and is more practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as ensure continued public transparency and understanding across a diversity of values in regards to the management and existence of wolves in Montana. The proposed action would not change the status of the existing area.

#### **Secondary Impacts**

Under the proposed action, there would be long-term, minor, secondary impacts on *Terrestrial, Avian, and Aquatic Life and Habitats*. Wolf management under the proposed action can have positive secondary impacts to *Terrestrial, Avian, and Aquatic Life and Habitats* because habitat suitable for wolves limits disturbance of habitats for all species. Continued focus on habitat management and conflict prevention actions as described in the 2023 Wolf Plan can provide a positive secondary impact to other game or predator populations due to overlap with their respective conservation and management issues. Habitat conditions that are compatible with long-term population viability will be maintained under the proposed action.

See **Chapter 3.8** for federally listed ESA species and Montana Species of Concern that benefit from the same habitat management practices that would be provided by the proposed action, as they require habitat security, forage, cover, denning habitat, winter range, and linkage zones to move between resources similar to wolves.

The following game and furbearer species (Table 8) also benefit from the same management practices provided by the proposed action as they require habitat security, forage, cover, denning habitat, winter range, and linkage zones to move between resources similar to wolves.

Table 8. Game and Furbearer Species benefitting from the proposed action.

Elk	Mountain goat	Pine marten	Beaver	Black bear
Mule deer	Bighorn sheep	Fisher	Muskrat	Mountain lion
White-tailed deer	Mink	Wolverine	Bobcat	Ruffed grouse
Moose	Otter	Dusky grouse	Turkeys	

The following Community Types of Greatest Conservation Need (FWP State Wildlife Action Plan 2015; Table 9) benefit from the same management practices provided by the proposed action as they benefit from limited disturbance and development that comes with the conservation of wolf habitat. All non-game species that reside within these habitats would also benefit.

Table 9. Community Types of Greatest Conservation Need (FWP State Wildlife Action Plan, 2015)

Intermountain streams	Floodplain and riparian	Conifer-dominated forest and woodland	Lakes and reservoirs
Mountain streams	Wetlands	Montane grassland	Alpine

### Cumulative Impacts

Under the proposed action, there would be long-term, minor, cumulative impacts on *Terrestrial, Avian, and Aquatic Life and Habitats*. Wolf management under the 2023 Wolf Plan would have positive cumulative impacts to *Terrestrial, Avian, and Aquatic Life and Habitats* because habitat suitable for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. The proposed action will result in continued protection of *Terrestrial, Avian, and Aquatic Life and Habitats* in Montana. Therefore, cumulative impacts on *Terrestrial, Avian, and Aquatic Life and Habitats* would be consistent with current impacts in the areas where they occur.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any

impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term, minor, cumulative.

Predator densities and diversity may influence prey abundances and distributions. As a result, wolf management and big game management are intertwined. The ecology of wolves and the interspecific interactions they have with those with whom they share the landscape are described in **Chapter 1, Section 1.2.1**. The current population status and distributions of wolves in Montana can be found in **Chapter 1, Section 1.2.3**. Although often not the sole limiting factor, in certain contexts, wolves have the potential to influence ungulate populations, the primary prey source of wolves. Deer (white-tailed deer and mule deer) and elk populations have fluctuated, with predation being one of several factors (i.e., harvest, habitat loss, harsh environmental conditions) driving prey population vital rates, and as such, abundance and/or population densities. To date, the scientific literature has little evidence to support wolves influencing disease prevalence in ungulates (**Chapter 1, Section 1.2.1**). FWP does not assume trends in ungulate population to be driven exclusively by wolf population dynamics, rather wolf population dynamics represent a single, albeit important element among many other variables impacting such trends. Distribution maps of other species (<https://gis-mtftp.hub.arcgis.com/search?tags=wildlife>) and species-specific management information (<https://fwp.mt.gov/conservation/wildlife-management>) can be found on the FWP website. Though the management of wolves and their habitats will indirectly influence populations of tangential species, they are not described here in detail (see **Chapter 1, Section 1.2.1**).

In addition, license dollars contribute to wildlife and habitat management and are driven by harvest opportunities, primarily that of ungulates (Table 10). Hunting and trapping license fees are matched by Pittman-Robertson funds and channeled back into management of the resources generating the funds. FWP has specific programs (e.g., Wildlife Habitat Improvement Grants) that focus on, but are not limited to, landscape-scale projects on lands that are open to public harvesting and involve priority wildlife habitats, noxious weed infestations that directly impact habitat functions, broad partnerships involving multiple landowners, proposals with leveraging beyond the minimum match funding requirement, and projects that retain or restore native plant communities. Other projects include Habitat Montana, which focuses on land conservation initiatives to benefit wildlife and maintain other natural resource values of private lands, and the Forest Legacy Program, which focuses on habitat management for private forested lands. FWP owns and manages a network of WMAs across the state to benefit wildlife (wintering ungulates in particular) and public recreation. Habitat management and conservation targeted for ungulates are indirectly also benefiting wolves. From 2009–2022, the FWP forestry program has treated 11,241 acres on state lands under its jurisdiction as mandated by § 87-1-201, § 87-1-622, and § 87-1-621, MCA. From 2021–2022, habitat projects cost about \$257,991, and as of 2023, FWP was awarded \$713,485 in active grant funds to treat 7,783-11,863 acres of forested habitat (FWP 2023). From 2004–2022, FWP has established approximately 261,198 acres in conservation easements costing approximately \$146,340,726 and about 149,535 acres in fee acquisitions costing approximately \$148,333,637 statewide (FWP, personal communication). Protection of these public lands from fragmentation and development provide long-term suitable habitat availability for wolves and other wildlife species present.

As per the National Environmental Policy Act (NEPA), federal land management agencies manage lands from an ecosystem-level perspective, considering all components and functional relationships. Habitat projects by acreage and dollars spent on federal lands by federal natural resource agencies, although

not quantified in this document, also provide significant contributions to habitat conservation and management across Montana. Non-governmental organizations often collaborate and partner with one another, the USFS, and/or FWP to fund additional habitat efforts benefiting wildlife communities, including wolves and their prey. For example, the Rocky Mountain Elk Foundation, since its inception in 1984, has conserved or enhanced 930,000 acres (i.e., land acquisitions, research, and improvement of habitat quality through stewardship projects such as prescribed burns, thinning, aspen enhancement, and wildlife water developments) totaling \$230 million in Montana. These kinds of habitat improvements and conservation projects may benefit many species including wolves and ungulate prey species. Designation of actual habitat linkage zones or migration corridors is impractical for a habitat generalist and highly mobile species like wolves. Therefore, habitat conservation and management across broad landscapes and land ownership designations is more important for wolf population viability because of dispersal rates and distance capabilities that allow metapopulations to remain interconnected (Fritts and Carbyn 1995). Yellowstone and Glacier National Parks can function as refuges at opposite ends of the geographic extent of wolf distribution in the NRM. The network of public lands in western Montana, central Idaho, and northwest Wyoming facilitates connectivity between wolf and other wildlife populations.

Table 10. Total revenue from license sales for harvest seasons of ungulate species in Montana from 2007–2022.

<b><u>Fiscal Year</u></b>	<b><u>Total Revenue</u></b>
2007	\$7,681,543.50
2008	\$7,726,602.50
2009	\$8,123,746.50
2010	\$7,962,468.50
2011	\$11,478,456.50
2012	\$10,786,709.50
2013	\$13,282,821.00
2014	\$13,189,905.00
2015	\$14,427,086.00
2016	\$15,226,295.00
2017	\$16,706,523.00
2018	\$16,518,787.00
2019	\$19,385,640.00
2020	\$19,084,776.50

2021	\$19,365,223.80
2022	\$18,407,667.00

## 3.3 PHYSICAL ENVIRONMENT RESOURCE 2: WATER QUALITY, QUANTITY, AND DISTRIBUTION

### 3.3.1 INTRODUCTION

This section provides an overview of the *Water Quality, Quantity, and Distribution* within the analysis area and the governing regulatory authorities.

Wolf management can have impacts to *Water Quality, Quantity, and Distribution* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Water Quality, Quantity, and Distribution* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Water Quality, Quantity, and Distribution* is described above in **Chapter 3, Section 3.1.3**.

### 3.3.2 ENVIRONMENTAL CONSEQUENCES

#### 3.3.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed action would therefore impact *Water Quality, Quantity, and Distribution*. Wolves will continue to inhabit the analysis area and will have no new impact on *Water Quality, Quantity, and Distribution* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Water Quality, Quantity, and Distribution* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies

(e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management may have positive secondary and cumulative impacts to *Water Quality, Quantity, and Distribution* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new residential, commercial, or industrial developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.3.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no direct impacts on *Water Quality, Quantity, and Distribution*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Water Quality, Quantity, and Distribution* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and would be more practical with implementable strategies, improved monitoring methods, changes in harvest management tools, and/or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as ensure continued public transparency and understanding while capturing a diversity of values regarding wolves in Montana. The proposed action would not change the status of the existing area. *Water Quality, Quantity, and Distribution* would continue to be protected by limits on disturbances and new developments on public lands.

#### **Secondary Impacts**

Under the proposed action, there would be long-term, negligible, secondary impacts on *Water Quality, Quantity, and Distribution*. Wolf management may have positive secondary impacts to *Water Quality, Quantity, and Distribution* because habitat management for wolves limits disturbance of habitats for all species. Management to limit new residential, commercial, or industrial developments ensure there is protected suitable habitat for a diversity of wildlife.

#### **Cumulative Impacts**

Under the proposed action, there would be long-term, negligible, cumulative impacts on *Water Quality, Quantity, and Distribution*. Wolves may forage by lakes or riverbeds, but this would result in negligible changes to the shape and dynamics of such water sources. Wolf management can have positive cumulative impacts to *Water Quality, Quantity, and Distribution* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term, negligible, and cumulative.

## **3.4 PHYSICAL ENVIRONMENT RESOURCE 3: GEOLOGY, SOIL QUALITY, STABILITY, AND MOISTURE**

### **3.4.1 INTRODUCTION**

This section provides an overview of the *Geology, Soil Quality, Stability and Moisture* within the analysis area and the governing regulatory authorities.

Wolf management can impact to *Geology, Soil Quality, Stability and Moisture* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including any direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Geology, Soil Quality, Stability and Moisture* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Geology; Soil Quality, Stability and Moisture* is described above in **Chapter 3, Section 3.1.3**.

## 3.4.2 ENVIRONMENTAL CONSEQUENCES

### 3.4.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed action would therefore impact *Geology, Soil Quality, Stability and Moisture*. Wolves will continue to inhabit the analysis area and will have no new impact on *Geology, Soil Quality, Stability and Moisture* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Geology; Soil Quality, Stability and Moisture* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts to *Geology; Soil Quality, Stability and Moisture* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### 3.4.2.2 Alternative 2 – Proposed Action

#### Direct Impacts

Under the proposed action, there would be no direct impacts on *Geology, Soil Quality, Stability and Moisture*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Geology, Soil Quality, Stability and Moisture* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is more practical with

implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as ensure continued public transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Geology, Soil Quality, Stability and Moisture* due to current and future activities in the existing area would continue.

### **Secondary Impacts**

Under the proposed action, there would be long-term, negligible, secondary impacts on *Geology, Soil Quality, Stability and Moisture*. Wolf management can have positive secondary impacts to *Geology, Soil Quality, Stability and Moisture* because habitat management for wolves limits disturbance of habitats for all species. Management to limit new residential, commercial, or industrial developments ensure there is protected suitable habitat for a diversity of wildlife.

### **Cumulative Impacts**

Under the proposed action, there would be long-term, negligible, cumulative impacts on *Geology, Soil Quality, Stability and Moisture*. While foraging, wolves could change the soil structure but these occurrences would be negligible. Wolves may also impact soil structure and stability when denning, however this would be short-term and minor. Wolf management can have positive cumulative impacts to *Geology; Soil Quality, Stability and Moisture* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term, negligible, and cumulative.

## 3.5 PHYSICAL ENVIRONMENT RESOURCE 4: VEGETATION COVER, QUANTITY, AND QUALITY

### 3.5.1 INTRODUCTION

This section provides an overview of the *Vegetation Cover, Quantity, and Quality* within the analysis area and the governing regulatory authorities.

Wolf management can have impacts to *Vegetation Cover, Quantity, and Quality* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Vegetation Cover, Quantity, and Quality* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Vegetation Cover, Quantity, and Quality* is described above in **Chapter 3, Section 3.1.3**.

### 3.5.2 ENVIRONMENTAL CONSEQUENCES

#### 3.5.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Vegetation Cover, Quantity, and Quality*. Wolves will continue to inhabit the analysis area and will have no new impact on *Vegetation Cover, Quantity, and Quality* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Vegetation Cover, Quantity, and Quality* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies

(e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts to *Vegetation Cover, Quantity, and Quality* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.5.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no direct impacts on *Vegetation Cover, Quantity, and Quality*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Vegetation Cover, Quantity, and Quality* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Vegetation Cover, Quantity, and Quality* due to current and future activities in the existing area would continue.

#### **Secondary Impacts**

Under the proposed action, there would be long-term, negligible, secondary impacts on *Vegetation Cover, Quantity, and Quality*. Wolf management can have positive secondary impacts to *Vegetation Cover, Quantity, and Quality* because habitat management for wolves limits disturbance of habitats for all species. Management to limit new residential, commercial, or industrial developments ensure there is protected suitable habitat for a diversity of wildlife.

#### **Cumulative Impacts**

Under the proposed action, there would be long-term, negligible, cumulative impacts on *Vegetation Cover, Quantity, and Quality*. Wolves may have indirect effects on White-Bark Pine or other fruiting vegetation while foraging (a small portion of their diet), which would negligibly impact vegetative quality and quantity. In fact, their presence (and scat) in an area might facilitate germination and growth of fruiting vegetation. Wolf management can have positive cumulative impacts to *Vegetation Cover, Quantity, and Quality* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term, negligible, and cumulative.

## 3.6 PHYSICAL ENVIRONMENT RESOURCE 5: AESTHETICS

### 3.6.1 INTRODUCTION

This section provides an overview of the *Aesthetics* within the analysis area and the governing regulatory authorities.

Many people find intrinsic value in knowing wolves are present. Some may see a wolf in the wild and find that aesthetically pleasing. Others may have the opposite reaction and feel that wolf presence is unacceptable. Either alternative of a statewide management plan and its implementation do not affect the overall *Aesthetics* of an area since wolves have saturated much of the landscape in all suitable habitat, occurring throughout western Montana, and yet are rarely seen. However, wolf management can have impacts to *Aesthetics* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Aesthetics* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Aesthetics* is described above in **Chapter 3, Section 3.1.3**.

## **3.6.2 ENVIRONMENTAL CONSEQUENCES**

### **3.6.2.1 Alternative 1 – No Action**

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Aesthetics*. Wolves will continue to inhabit the analysis area and will have no new impact on *Aesthetics* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Aesthetics* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

FWP would expect wolf abundances, population distribution, and events of wolf-livestock conflict to remain stable with the current harvest regulations. Wolves could potentially impact local recruitment of wild ungulates. FWP would continue to provide outreach and education to minimize wolf-livestock conflict, as well as mitigate conflict response using lethal and non-lethal methods. The benchmark of a *minimum* of 15 breeding pairs or 450 wolves (or whatever stated minimum threshold if modified, in coordination with the USFWS benchmark for relisting) would be maintained and FWP would continue to use regulated harvest as a wildlife management tool. Under the *No Action Alternative*, little would change compared with the current situation. With ESA delisting of wolves, authority of wolf management was given to the state, thereby FWP would continue to manage wolves in Montana.

Wolf management can have positive secondary and cumulative impacts to *Aesthetics* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new

developments, and thereby maintains a healthy ecosystem. Continued focus on habitat management and conflict prevention actions as described in the 2003 Wolf Plan can provide a positive secondary and cumulative impact to other game or predator populations due to overlap with their respective conservation and management issues. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.6.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no new direct impacts on *Aesthetics*. Wolves will continue to inhabit Montana and will have no direct impacts on *Aesthetics* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Aesthetics* due to current and future activities in the existing area would continue.

#### **Secondary Impacts**

Under the proposed action, there would be long-term, secondary impacts on *Aesthetics*. Secondary impacts could be beneficial or adverse, or minor or significant depending on a particular individual's beliefs and values. Conservation of wolves and their habitat will benefit multiple species and landscapes that contribute to the *Aesthetics* of the analysis area for some people, as some people value the potential to view wolves in the wild or knowing they are there. Some people will never accept wolves being present in an area and will be unwilling to adjust their behaviors as a result. Others feel strongly that everyone must adjust as necessary to cohabitate with wolves. FWP decisions or actions made within the sideboards of the 2023 Wolf Plan could impact *Aesthetics* for some people. However, wolf management can have positive secondary impacts to *Aesthetics* because habitat management for wolves limits disturbance of habitats for all species. See "Values associated with wolves: benefits and challenges of wolf presence in Montana" for more information (**Chapter 3, Section 3.1.3**).

#### **Cumulative Impacts**

Under the proposed action, there would be long-term, minor, cumulative impacts on *Aesthetics*. Some people value the potential to view wolves in the wild or know they are there. Some people will never accept wolves being present in an area and will be unwilling to adjust their behaviors as a result. Others feel strongly that everyone must adjust as necessary to cohabitate with wolves. FWP decisions or actions made within the sideboards of the 2023 Wolf Plan could impact *Aesthetics* for some people. However, wolf management can have positive cumulative impacts to *Aesthetics* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. See "Values associated with wolves: benefits and challenges of wolf presence in Montana" for more information (**Chapter 3, Section 3.1.3**).

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term, minor, and cumulative.

## 3.7 PHYSICAL ENVIRONMENT RESOURCE 6: AIR QUALITY

### 3.7.1 INTRODUCTION

This section provides an overview of the *Air Quality* within the analysis area and the governing regulatory authorities.

Wolf management can have impacts on *Air Quality* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape. These environments include, but are not limited to, national forests, national parks, wilderness areas, state forests and parks, state and federal wildlife management areas, and locally protected lands.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Air Quality* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Air Quality* is described above in **Chapter 3, Section 3.1.3**.

FWP must *consider* potential air quality impacts from a proposed project and determine their significance, as it relates to existing ambient air quality in the area affected by a proposed project. The affected area, in this case, is the entirety of the state of Montana. FWP compares potential air quality impacts of the proposed action against the National Ambient Air Quality Standards or NAAQS, established by the Environmental Protection Agency (EPA) and enforced by EPA and the Montana Department of Environmental Quality (DEQ). The NAAQS provide health and welfare-based standards for Criteria Air Pollutants (regulated air pollutants) including particulate matter (PM, including fugitive dust or TSP, PM<sub>10</sub>, and PM<sub>2.5</sub>); ground-level ozone (O<sub>3</sub>); carbon monoxide (CO), lead (Pb), sulfur dioxide (SO<sub>2</sub>), and nitrogen dioxide (NO<sub>2</sub>).

NAAQS compliance status is classified as follows:

- Nonattainment Areas. The area currently exceeds an applicable NAAQS and is subject to requirements contained in a State or Tribal implementation plan (SIP or TIP) developed to bring the area back into compliance with the applicable NAAQS. FWP projects occurring within or near (~ 2 km) these areas would be subject to stringent requirements limiting emissions of the pollutant of concern to ensure the project does not further impact (cause or contribute to) the affected area's NAAQS compliance status.
- Maintenance/Limited Maintenance Areas. The area has historically exceeded the NAAQS but currently attains or complies with the applicable NAAQS under the requirements of a Maintenance Plan or Limited Maintenance Plan, approved under the SIP or TIP. Again, FWP projects occurring in these areas would be subject to stringent requirements limiting emissions of the pollutant of concern to ensure the project does not again exceed the applicable NAAQS.
- NAAQS Compliance Status for Other Regulated Pollutants in the Affected Area. The Nonattainment or Maintenance Area is specific to the applicable NAAQS, meaning an area can be Nonattainment for a given pollutant, Attainment or Unclassifiable for other pollutants, or Nonattainment for additional NAAQS.
- Unclassifiable. The area has not been subject to ambient air quality monitoring; therefore, compliance status with the NAAQS is unknown. In practice, and for the purposes of MEPA review, these areas are considered Attainment or Unclassifiable for all NAAQS.
- Attainment. The area has been subject to ambient air quality monitoring and has demonstrated compliance with the applicable NAAQS.

Generally, air quality in Montana is considered Unclassifiable or Attainment for the applicable NAAQS. Historically, however, ambient air quality monitoring conducted at various locations across the state has demonstrated non-compliance or Nonattainment for certain NAAQS including the following, listed by location and applicable NAAQS:

- Libby (PM<sub>2.5</sub> Maintenance Area, PM<sub>10</sub> Maintenance Area)
- Whitefish (PM<sub>10</sub> Maintenance Area)
- Columbia Falls (PM<sub>10</sub> Maintenance Area)
- Kalispell (PM<sub>10</sub> Maintenance Area)
- Thompson Falls (PM<sub>10</sub> Maintenance Area)
- Missoula (PM<sub>10</sub> Maintenance Area, CO Maintenance Area)
- Great Falls (CO Maintenance Area)
- East Helena (Pb Maintenance Area)

- Butte (PM<sub>10</sub> Maintenance Area)
- Laurel (SO<sub>2</sub> Nonattainment Area)
- Billings (CO Maintenance Area, SO<sub>2</sub> Maintenance Area)
- Polson, Tribal (PM<sub>10</sub> Nonattainment Area)
- Ronan, Tribal (PM<sub>10</sub> Nonattainment Area)
- Lame Deer, Tribal (PM<sub>10</sub> Nonattainment Area)

Because NAAQS compliance status for the affected areas listed above relies on stringent requirements contained in the SIP or affected TIP, any FWP project locating within or near a Nonattainment or Maintenance Area would be subject to the same stringent requirements to ensure the area does not continue to exceed the applicable NAAQS. Therefore, the proposed project would not be expected to cause or contribute to a violation of the NAAQS.

## 3.7.2 ENVIRONMENTAL CONSEQUENCES

### 3.7.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed action would therefore impact *Air Quality*. Wolves will continue to inhabit the analysis area and will have no new impact on *Air Quality* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Air Quality* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts to *Air Quality* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new

developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.7.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no direct impacts to *Air Quality*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Air Quality* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as ensure continued public transparency and understanding while capturing a diversity of values regarding wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Air Quality* due to current and future activities in the existing area would continue.

Existing sources of air pollution in Montana are limited and generally include wildfire and prescribed burning, fugitive dust associated with high wind events and exposed ground, vehicle travel on unpaved roads (fugitive dust), vehicle exhaust emissions, and various agricultural practices (vehicle exhaust emissions and fugitive dust). Further, some significant point-sources of air pollution exist in the state (i.e., Colstrip Power Plant). The proposed action to adopt and implement a statewide wolf management plan would not be expected to result in any direct air quality impacts. However, specific projects conducted under the proposed statewide management plan may impact air quality. Any specific future project (i.e., land management activities) would be subject to additional environmental review under MEPA and any project specific air quality impacts would be identified and addressed at that time. Therefore, the proposed project would not be expected to cause or contribute to a violation of the applicable NAAQS and thus no direct air quality impacts would be expected.

#### **Secondary Impacts**

Under the proposed action, there would be long-term, negligible, secondary impacts on *Air Quality*. Wolf management can have positive secondary impacts to *Air Quality* because habitat management for wolves limits disturbance of habitats for all species. Management to limit new residential, commercial, or industrial developments ensure there is protected suitable habitat for a diversity of wildlife.

#### **Cumulative Impacts**

Under the proposed action, there would be long-term, negligible, cumulative impacts on *Air Quality*. Wolves produce methane but this is negligible and comparative to that of other wildlife. As wolves traverse the landscape, they may produce dust or mold (aspergillosis), but these impacts would be negligible. Wolf management can have positive cumulative impacts to *Air Quality* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term, negligible, and cumulative.

## 3.8 PHYSICAL ENVIRONMENT RESOURCE 7: UNIQUE, FRAGILE, OR LIMITED ENVIRONMENTAL RESOURCES

### 3.8.1 INTRODUCTION

This section provides an overview of the *Unique, Fragile, or Limited Environmental Resources* within the analysis area and the governing regulatory authorities.

Wolves could be considered a unique or limited environmental resource. Under both alternatives, a statewide management plan and its implementation will ensure population sustainability in Montana. Wolves will be managed at levels sufficient to maintain recovered populations under either alternative. Wolf management can have impacts to *Unique, Fragile, or Limited Environmental Resources* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Unique, Fragile, or Limited Environmental Resources* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Unique, Fragile, or Limited Environmental Resources* is described above in **Chapter 3, Section 3.1.3**.

## 3.8.2 ENVIRONMENTAL CONSEQUENCES

### 3.8.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Unique, Fragile, or Limited Environmental Resources*. Wolves will continue to inhabit the analysis area and will have no new impact on *Unique, Fragile, or Limited Environmental Resources* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Unique, Fragile, or Limited Environmental Resources* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts to *Unique, Fragile, or Limited Environmental Resources* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### 3.8.2.2 Alternative 2 – Proposed Action

#### Direct Impacts

Under the proposed action, there would be no direct impacts on *Unique, Fragile, or Limited Environmental Resources*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Unique, Fragile, or Limited Environmental Resources* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e.,

the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Unique, Fragile, or Limited Environmental Resources* due to current and future activities in the existing area would continue.

### Secondary Impacts

Under the proposed action, there would be long-term, negligible, secondary impacts on *Unique, Fragile, or Limited Environmental Resources*. Wolf management can have positive secondary impacts to *Unique, Fragile, or Limited Environmental Resources* because habitat management for wolves limits disturbance of habitats for all species.

The following is a list of Montana Species of Concern (rank 1 or 2; Table 11) and federally listed ESA species that benefit from the same habitat management practices that would be provided by the proposed action, as they require habitat security, forage, cover, denning habitat, winter range, and linkage zones to move between resources similar to wolves.

Table 11. Montana Natural Heritage Program, animal Species of Concern in the affected area (<https://mtnhp.org/SpeciesOfConcern/>).

Reptiles	Birds	Mammals	Fish
Idaho giant salamander	Black-rosy finch	Northern bog lemming	Arctic grayling
Coeur d'Alene salamander	Gray-crowned rosy finch	Canada lynx	Bull trout
Northern leopard frog	Harlequin duck	Grizzly bears	Columbia River redband trout
Western toad	Black swift	Black-footed ferret	Lake trout
Plains hog-nosed snake	Lewis's woodpecker	Northern long-eared bat	Westslope cutthroat trout
Western milksnake	Least tern	Northern short-tailed shrew	Yellowstone cutthroat trout
Smooth greensnake	Whooping crane	Bison	Pallid sturgeon
Great plains toad	Piping plover	White-tailed prairie dog	White sturgeon
	Chestnut-collared longspur	Northern myotis	Sicklefin chub
	Greater sage grouse	Arctic shrew	Northern pearl dace
	Mountain plover		Trout-perch
	Caspian tern		Paddlefish
			Sauger

There are three federally listed ESA plants within the project area that could benefit from habitat conservation actions implemented by a statewide plan from either alternative. Two species are unique in that they are found in very specific habitats and exist in very few, small pockets.

Spalding's catchfly (*Silene spaldingii*) exists in only a few locations in the northwest corner of the state. Extant occurrences are known in the following areas: Tobacco Plains area, Lost Trail National Wildlife

Refuge, the Niarada area, and Wild Horse Island. Most occurrences have less than 100 individuals, though three sites are each known to contain over 1,000 individuals and the total population size in Montana is likely 20,000+ mature plants based upon 2011 data (Montana Natural Heritage Program.)

Ute ladies'-tresses (*Spiranthes diluvialis*) is known from a small number of occurrences in southwest and south-central Montana. Plants occur in the valleys of the Missouri, Jefferson, Beaverhead, Ruby, and Madison river drainages, where it is restricted in area by specific hydrologic requirements. Many populations have less than 100 individuals, though a couple have over 500 plants (Montana Natural Heritage Program).

The third federally listed plant species, whitebark pine, is not unique, fragile, or limited. Whitebark pine is a common component of subalpine forests and a dominant species of treeline and krummholz habitats. It occurs in almost all major mountain ranges of western and central Montana (Montana Natural Heritage Program). As whitebark pine overlaps wolf habitat there will no adverse secondary impacts to the species; rather, the conservation of wolf habitat is beneficial to whitebark pine.

Twenty other plant species within the project area have been designated "Species of Concern" (rank 1 or 2; Table 12), primarily because of their rarity or habitat specificity. These species benefit from the same management practices provided by the proposed action as they benefit from limited disturbance and development that comes with the conservation of wolf habitat.

Table 12. Montana Natural Heritage Program, plant Species of Concern in the affected area (<https://mtnhp.org/SpeciesOfConcern/>).

Prairie Moonwort	Giant Helleborine	Red Sage	Lake-bank Sedge	Yellow Beeplant	Aquatic Rhynchosstegium Moss
Wishbone Moonwort	Sheathed Cotton-grass	Island Koenigia	Western Sedge	Alpine Collomia	Warnstorfia Moss
Frenchman's Bluff Moonwort	Northern Fescue	Slender Hareleaf	Rock Sedge	Pale Corydalis	Limprichtia Moss
Linearleaf Moonwort	Water Star-grass	Latah Tule Pea	Glaucus Beaked Sedge	Fendler Cat's-eye	A Scorpidium Moss
Michigan Moonwort	Tapered Rush	Matted Prickly-phlox	Pointed Broom Sedge	Miner's Candle	Narrowleaf Peatmoss
Stalked Moonwort	Coville's Rush	Columbia Lewisia	Small-winged Sedge	Nine-anther prairie clover	A Peatmoss
Least Moonwort	Large-fruited Kobresia	Pale-spiked Lobelia	Steven's Scandinavian Sedge	Silky prairie clover	Cushion Peatmoss
Spoon-leaf Moonwort	Pale Duckweed	Geyer's Biscuitroot	Many-headed Sedge	Meadow Larkspur	Contorted Sphagnum Moss
Moosewort	Flowering Quillwort	Nuttall Desert-parsley	Thin-flowered Sedge	Slim Larkspur	Fringed Bogmoss
Yakutat Moonwort	Columbia Lily	Marsh Felwort	Sheathed Sedge	Pale Larkspur	Brown Hair Peatmoss
Meadow Horsetail	Loesel's Twayblade	Desert Dandelion	Short-pointed Flatsedge	Wyoming Tansymustard	Star Hair Peatmoss
Western Quillwort	Foxtail Muhly	Bractless blazingstar	Shining Flatsedge	Bloom Peak Douglasia	Red Spoon Peatmoss

Treelike Clubmoss	Guadalupe Water-nymph	Dwarf mentzelia	Red-root Flatsedge	Great Basin Downingia	Mendocino Peatmoss
Northern Bog Clubmoss	Ice Grass	Oregon Bluebells	Schweinitz's Flatsedge	Dense-leaf Draba	Streamside Peatmoss
Running-pine	Dense-flower Rein Orchid	Tiny Swamp Saxifrage	Sparrow's-egg Lady's-slipper	White Arctic Draba	Wulf's Peatmoss
Pepperwort	Banff Bluegrass	Storm Saxifrage	Panic Grass	Round-fruited Draba	Wideleaf Stegona Moss
Northern Beechfern	Lemmon's Alkaligrass	Short-flowered Monkeyflower	Scribner's Panic Grass	Macoun's Draba	Bartram's Syntrichia Moss
Kruckeberg's Swordfern	Slender Bulrush	North Idaho Monkeyflower	Delicate Spikerush	Porsild's Draba	Norwegian Syntrichia Moss
Mountain Swordfern	Sprangletop	Thinsepal monkeyflower	Long-sheath Waterweed	Wind River Draba	Antler Twist Moss
Northern Spikemoss	Northern Blue-eyed-grass	Dwarf Purple Monkeyflower	Sand Wildrye	Slenderleaf Sundew	Elfin Crisp Moss
Cusick's Horsemint	Ute Ladies'-tresses	Square-stem Monkeyflower	Northern Wildrye	Entire-leaved Avens	Delicate Arctic Scale Lichen
Western Joepywe-weed	Small Dropseed	Nama	Spiny Hopsage	Whitestem Goldenbush	Subcentric Ring Lichen
Alkali Marsh Aster	Letterman's Needlegrass	Divaricate Navarretia	Howell's Gumweed	Parry's Mountain Rabbitbrush	Friendly Camouflage Lichen
Red Alder	Small Tofieldia	Blue Toadflax	Small-flower Gymnosteris	Idaho Fleabane	Roger's Vagabond Lichen
Scarlet Ammannia	Hudson's Bay Bulrush	Pygmy Water-lily	Little Sunflower	Evermann Fleabane	Stump Pixie-Cup Lichen
Dense-leaved Pussytoes	Tufted Club-rush	Pale Evening-primrose	Western Pearl-flower	Beautiful Fleabane	Thorny Pixie-Sticks Lichen
Short-styled Columbine	California False-hellebore	Columbia Locoweed	Hutchinsia	Smooth Fleabane	Pustulate Tarpaper Lichen
Greenleaf Manzanita	Columbia Water-meal	Nodding Locoweed	Scaepod	Linear-leaf Fleabane	Frosted Finger Lichen
Swamp Milkweed	Short-beaked Aloe Moss	Parry's Locoweed	Bush morning-glory	Parry's Fleabane	Diluted Wart Lichen
Ovalleaf Milkweed	Black Golf Club Moss	Stalked-pod Locoweed	Ballhead Ipomopsis	Slender Fleabane	Netted Lungwort Lichen
Narrowleaf Milkweed	A Cinclidium Moss	Alpine Glacier Poppy	Small-flower Ipomopsis	Mat Buckwheat	Gray Lungwort Lichen
Sweetwater Milkvetch	A Cynodontium Moss	Alpine Poppy	Hooded Bush Lichen	Smooth Buckwheat	Cabbage Lungwort Lichen
Painted Milkvetch	Olympic Dichodontium Moss	Pink Coil-beaked Lousewort	Hayden's Rimmed Navel Lichen	Visher's Buckwheat	Textured Lungwort Lichen
Geyer's Milkvetch	Schreber's Dicranella Moss	Selway Coil-beaked Lousewort	Lovely Pin Lichen	Spotted Joepywe-weed	Northern Camouflage Lichen
Gray's Milkvetch	Acuteleaf Dicranum Moss	Scallop-leaf Lousewort	Lesser Tundra Owl Lichen	Arctic Eyebright	Alpine Foxtail Lichen
Lackschewitz' Milkvetch	Lime-Seep Eucladium Moss	Narrowleaf Penstemon	Greater Tundra Owl Lichen	Glaucous Gentian	Elf-Ear Lichen

Wind River Milkvetch	Silky Urn Moss	Large Flowered Beardtongue	Fringed Chocolate Chip Lichen	Macoun's Gentian	Fingered Shingle Lichen
Raceme Milkvetch	Flat Pocket Moss	Low Beardtongue	Tuckermann's Coral Lichen	Hiker's Gentian	Western Waterfan Lichen
Railhead Milkvetch	Britton's Dry Rock Moss	Payette Beardtongue	Easter Foam Lichen	Common Blue-cup	Fringed Pelt Lichen
Sandweed	Curved Dry Rock Moss	Whipple's Beardtongue	Granulating Rocktripe Lichen	Spiny Greasebush	Least Shadow Lichen
Longleaf Oregon-grape	Hamatocaulis Moss	Arctic Sweet Coltsfoot	Kootenai Speck Lichen	Bractless Hedge-hyssop	Chalky Bush Lichen
Beck Water-marigold	Waterfall Copper Moss	Hot Spring Phacelia	Tapertip Onion	Spalding's Catchfly	Trailing Black Currant
Sapphire Rockcress	Heim's Hennediella Moss	Keeled Bladderpod	Columbia Onion	Prairie Goldenrod	Swamp Red Currant
Daggett Rockcress	Giant Golden Moss	Woolly Twinpod	Small Onion	Fleshy Stitchwort	Toothcup
Watershield	A Conecap Moss	Douglas Bladderpod	Simil Onion	Wyoming Sullivantia	Nagoonberry
Low Braya	Umbrella Moss	Bitterroot Bladderpod	Nevada Clubrush	Soft Aster	Arctic Pearlwort
Mojave Brickellbush	Meesia Moss	Lesica's Bladderpod	River Bulrush	Mission Mountain kittentails	Barratt's Willow
Obscure Evening-primrose	Meesia Moss	Silver Bladderpod	Bruneau Mariposa Lily	Short-spine Horsebrush	Cascade Willow
Small Camissonia	Meesia Moss	Thick-leaf Bladderpod	Bristly Sedge	Alpine Meadowrue	Puzzling Rockcress
Few-seeded Bittercress	Lyall's Polytrichum Moss	Slender-branched Popcorn-flower	Crawe's Sedge	Northwestern Thelypody	Dwarf Saw-wort
Annual Indian Paintbrush	A Mousetail Moss	Spiny Skeletonweed	Coastal Sand Sedge	Slender Thelypody	Weber's Saw-wort
Slender Indian Paintbrush	Douglas' Neckera Moss	Short-leaved Cinquefoil	Velvetleaf Huckleberry	Idaho Goldenweed	Yellow Marsh Saxifrage
Bittersweet	Angled Paludella Moss	Low Arctic Cinquefoil	Nannyberry	Cushion Townsend-daisy	Clasping Groundsel
Chaffweed	A Windblown Moss	Alkali Primrose	Many-flowered Viguiera	Showy Townsend-daisy	Elmer's Ragwort
Alderleaf mountain-mahogany	Hooker's Physcomitrium Moss	Sand Cherry	Prairie Violet	Woolly-head Clover	Desert Groundsel
Smooth Goosefoot	Bigelow's Porotrichum Moss	Dwarf woolly-heads	Great-spurred Violet	Hollyleaf Clover	Scribner's Ragwort
Long-styled Thistle	A Pseudocrossidium Moss	Bur Oak	Idaho Barren Strawberry	Flatleaf Bladderwort	Shoshonea
Sand Springbeauty	Schleicher's Ptychostomum Moss	Straightbeak Buttercup	Sweetflag	Northern Bladderwort	Oregon Checker-mallow

## Cumulative Impacts

Under the proposed action, there would be long-term, negligible, cumulative impacts on *Unique, Fragile, or Limited Environmental Resources*. Wolves may predate on sensitive species or compete with species like lynx and grizzly bears, but these impacts would be negligible. Wolf management can have positive cumulative impacts to *Unique, Fragile, or Limited Environmental Resources* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term, negligible, and cumulative.

## 3.9 PHYSICAL ENVIRONMENT RESOURCE 8: HISTORICAL AND ARCHAEOLOGICAL SITES

### 3.9.1 INTRODUCTION

This section provides an overview of the *Historical and Archaeological Sites* within the analysis area and the governing regulatory authorities.

While historical and archaeological sites occur throughout the analysis area, a statewide management plan under either alternative and its implementation do not affect historical or archaeological sites as there is no development or ground disturbance of such sites resulting from a statewide management plan from either alternative and its implementation.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Historical and Archaeological Sites* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Historical and Archaeological Sites* is described above in **Chapter 3, Section 3.1.3**.

Specific projects conducted under the proposed statewide management plan may impact *Historical and Archaeological Sites*. Any specific future project (i.e., land management activities) would be subject to additional environmental review under MEPA and any project specific impacts to *Historical and Archaeological Sites* would be identified and addressed at that time. In keeping with the Montana Antiquities Act and related regulations (ARM 12.8.501-12.8.510), all undertakings on state lands are assessed by a qualified archaeologist or historian for their potential to affect cultural resources. Similarly, projects occurring on federal lands would be subject to the requirements of the National Environmental Policy Act or NEPA, including analysis of potential impacts to archaeological resources under Section 106 of the National Historic Preservation Act [54 U.S.C. § 306108] and its implementing regulations, Protection of Historic Properties [36 CFR part 800]. The process for this assessment may include a cultural resource inventory and evaluation of cultural resources within or near the project area. FWP also consults with all Tribal Historic Preservation Offices affiliated with each property in accordance with FWP's Tribal Consultation Guidelines. If cultural resources within or near the project area are recorded and are eligible for the National Register of Historic Places, they will be protected from adverse impacts through adjustments to the project design or cancellation of the project if no design alternatives are available. If cultural resources are unexpectedly discovered during project implementation, FWP would cease implementation and conduct further evaluation.

## **3.9.2 ENVIRONMENTAL CONSEQUENCES**

### **3.9.2.1 Alternative 1 – No Action**

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Historical and Archaeological Sites*. Wolves will continue to inhabit the analysis area and will have no new impact on *Historical and Archaeological Sites* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Historical and Archaeological Sites* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of

wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive cumulative impacts to *Historical and Archaeological Sites* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.9.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no new direct impacts on *Historical and Archaeological Sites*. Wolves will continue to inhabit Montana and will have no direct impacts on *Historical and Archaeological Sites* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Historical and Archaeological Sites* due to current and future activities in the existing area would continue.

#### **Secondary Impacts**

Under the proposed action, there would be no secondary impacts on *Historical and Archaeological Sites*.

#### **Cumulative Impacts**

Under the proposed action, there would be long-term, negligible, cumulative impacts on *Historical and Archaeological Sites*. Wolves may use historical or archeological sites as denning locations, and thus cause damage to these sites. While these impacts are negligible, FWP wolf specialists work to prevent these events from occurring. Wolf management can have positive cumulative impacts to *Historical and Archaeological Sites* because habitat management for wolves will help limit disturbance and development to *Historical and Archaeological Sites*.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term, negligible, and cumulative.

## 3.10 PHYSICAL ENVIRONMENT RESOURCE 9: ENERGY USE

### 3.10.1 INTRODUCTION

This section provides an overview of the *Energy Use* within the analysis area and the governing regulatory authorities.

A statewide plan, under either alternative, and its implementation will not affect *Energy Use*. The presence of wolves may impact energy development. Energy developers would have to consult with FWP to minimize and mitigate take.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Energy Use* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Energy Use* is described above in **Chapter 3, Section 3.1.3**.

Specific projects conducted under the proposed statewide management plan may impact *Energy* resources through increased fuel use. Fuel may be required to operate equipment used for specific land

management activities under the statewide management plan. Any specific future project (i.e., land management activities) would be subject to additional environmental review under MEPA and any project specific impacts to *Energy* (fuel use) would be identified and addressed at that time.

## **3.10.2 ENVIRONMENTAL CONSEQUENCES**

### **3.10.2.1 Alternative 1 – No Action**

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Energy Use*. Wolves will continue to inhabit the analysis area and will have no new impact on *Energy Use* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Energy Use* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

### **3.10.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no direct impacts on *Energy Use*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Energy Use* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture

a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Energy Use* due to current and future activities in the existing area would continue.

### **Secondary Impacts**

Under the proposed action, there would be no secondary impacts on *Energy Use*.

### **Cumulative Impacts**

Under the proposed action of adopting and implementing a statewide plan, there would be long-term, negligible, cumulative impacts on *Energy Use*. Energy development companies may decide not to build or implement in areas where wolves exist, thus potentially impacting energy use. If they do, associated NEPA and MEPA processes may be required.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term and negligible.

## **3.11 HUMAN POPULATION RESOURCE 10: SOCIAL STRUCTURES AND MORES**

### **3.11.1 INTRODUCTION**

This section provides an overview of the *Social Structures and Mores*, defined as pre-project social structures, customs, values, and conventions within the analysis area and the governing regulatory authorities.

The presence and densities of wolves in Montana is a polarizing subject reflecting strong, passionate views across a wide spectrum of attitudes and perspectives, from protection of wolves at any cost to complete elimination of wolves from the Montana landscape. It is clear, Montanans have a wide diversity of values about wolves; therefore, implementation of a statewide wolf management plan, under either alternative, aims to capture a wide breadth of perspectives. See “Values associated with wolves: benefits and challenges of wolf presence in Montana” for more information (**Chapter 3, Section 3.1.3**). Additionally, wolf populations and management, under either alternative, have the potential to impact local economies and businesses via ecotourism, hunting, wildlife viewing, and a host of other activities that result in impacts to local and state economies.

Under both alternatives, a statewide management plan and its implementation will ensure wolf population sustainability in Montana. Wolves will be managed at levels sufficient to maintain recovered populations under either alternative. Wolf management may impact existing *Social Structures and Mores* because habitat management for wolves limits disturbances from new residential, commercial, and industrial developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including any direct, secondary, and/or cumulative impacts of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to existing *Social Structures and Mores* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Social Structures and Mores* is described above in **Chapter 3, Section 3.1.3**.

## **3.11.2 ENVIRONMENTAL CONSEQUENCES**

### **3.11.2.1 Alternative 1 – No Action**

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact existing *Social Structures and Mores*. Wolves will continue to inhabit the analysis area and will have no new impact on existing *Social Structures and Mores* where they occur. The No Action Alternative would not change the status of existing *Social Structures and Mores* within the affected area. Impacts on *Social Structures and Mores* due to current and future activities in the affected area would continue.

Adjustments to pre-project social structures, customs, values, and conventions in the affected area (i.e., existing *Social Structures and Mores*) will be necessary under either alternative as state laws, policies, rules, and regulations, as well as overall sociopolitical environments, inevitably change through time.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports

have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

FWP would expect wolf abundances, population distribution, and wolf-livestock conflict events to remain stable with the current harvest regulations. Wolves could potentially impact local recruitment of wild ungulates. FWP would continue to provide outreach and education to minimize wolf-livestock conflict, as well as mitigate conflict response using lethal and non-lethal methods. The benchmark of a *minimum* of 15 breeding pairs or 450 wolves (or whatever stated minimum threshold if modified, in coordination with the USFWS benchmark for relisting) would be maintained and FWP would continue to use regulated harvest as a wildlife management tool. Under the *No Action Alternative*, little would change compared with the current situation. With ESA delisting of wolves (2011), authority of wolf management was given to the state, thereby FWP would continue to manage wolves in Montana under either alternative.

Wolf management can have positive secondary and cumulative impacts to *Social Structures and Mores* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new residential, commercial, and industrial developments, and thereby maintains a healthy ecosystem. Continued focus on habitat management and conflict prevention actions as described in the 2003 Wolf Plan can provide a positive secondary and cumulative impact to other game or predator populations due to overlap with their respective conservation and management issues. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.11.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be short-term, direct impacts on *Social Structures and Mores*. Direct impacts could be beneficial or adverse, or minor or significant depending on a particular individual's beliefs and values. Wolves will continue to inhabit Montana and will have some direct impacts on *Social Structures and Mores* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is more practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as

ensure continued public transparency and understanding while capturing a diversity of values regarding wolves in Montana. The proposed action would not change the status of the existing area. Impacts on pre-project social structures, customs, values, and conventions in the affected area (i.e., existing *Social Structures and Mores*) due to current and future activities in the existing area would continue. Adjustments to *Social Structures and Mores* will be necessary under either alternative as state laws, policies, rules, and regulations, as well as overall sociopolitical environments, inevitably change.

### **Secondary Impacts**

Under the proposed action, there would be long-term, secondary impacts on *Social Structures and Mores*. Secondary impacts could be beneficial or adverse, minor or significant depending on a particular individual's beliefs and values. Wolf management can have positive secondary impacts to *Social Structures and Mores* because habitat management for wolves limits disturbance of habitats for all species. See "Values associated with wolves: benefits and challenges of wolf presence in Montana" for more information (**Chapter 3, Section 3.1.3**).

### **Cumulative Impacts**

Under the proposed action, there would be long-term, cumulative impacts on *Social Structures and Mores*. Cumulative impacts could be beneficial or adverse, or minor or significant depending on a particular individual's beliefs and values. Wolf management can have positive cumulative impacts to *Social Structures and Mores* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. See "Values associated with wolves: benefits and challenges of wolf presence in Montana" for more information (**Chapter 3, Section 3.1.3**).

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term and cumulative.

## 3.12 HUMAN POPULATION RESOURCE 11: CULTURAL UNIQUENESS AND DIVERSITY

### 3.12.1 INTRODUCTION

This section provides an overview of the *Cultural Uniqueness and Diversity* within the analysis area and the governing regulatory authorities.

A statewide plan, under either alternative, and its implementation may have minor impacts on *Cultural Uniqueness and Diversity* in the analysis area as wolves are native and both alternatives ensure population sustainability in Montana. Wolves will be managed at levels sufficient to maintain recovered populations under either alternative. Wolf management can have impacts to *Cultural Uniqueness and Diversity* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape. Eight Tribal affiliations were notified of and invited to consult on this plan and associated EIS: Blackfoot Tribe of the Blackfoot Indian Reservation of Montana, Confederated Salish and Kootenai Tribes of the Flathead Reservation, Chippewa Cree Tribe of Rocky Boy's Reservation, Fort Peck Assiniboine and Sioux Tribes of Fort Peck Indian Reservation, Crow Tribe of Crow Indian Reservation, Little Shell Tribe of Chippewa Indians of Montana, and Northern Cheyenne Tribe and Indian Reservation. Additional emails were sent to alert the Tribes and follow-up calls were made later in the comment period. To date, no concerns were communicated by any Tribe. Further consultation with the Tribes will be pursued in accordance with Section 106 of the NHPA (54 USC § 306108) and its implementing regulations (36 CFR Part 800). The public at large is afforded opportunity to review and comment on the proposed action through distribution of the 2023 Wolf Plan and this DEIS and associated pre-project public scoping activities.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Cultural Uniqueness and Diversity* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Cultural Uniqueness and Diversity* is described above in **Chapter 3, Section 3.1.3**.

### 3.12.2 ENVIRONMENTAL CONSEQUENCES

#### 3.12.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Cultural Uniqueness and Diversity*. Wolves will continue to inhabit the analysis area and will have no impact on *Cultural Uniqueness and Diversity* where they occur. The No Action Alternative would not

change the status of the existing area. Impacts on *Cultural Uniqueness and Diversity* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts to *Cultural Uniqueness and Diversity* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.12.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be short-term, negligible, direct impacts to *Cultural Uniqueness and Diversity*. Wolves will continue to inhabit Montana and will have some direct impacts on *Cultural Uniqueness and Diversity* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Cultural Uniqueness and Diversity* due to current and future activities in the existing area would continue. Further, the proposed action would not be expected to encourage or result in the relocation of people. Therefore, no direct impacts to the existing cultural uniqueness and diversity of the affected area would be expected because of the proposed project.

Native American Tribes will continue to manage for wolves on their lands according to their respective tribal wildlife management practices. Each tribal nation develops their own guidance and prescriptions on wolf management, which likely differ from one another and may or may not be in an adopted management plan. FWP will emphasize efforts to collaborate and coordinate with Native American Tribes regarding wolf monitoring and management on tribal lands. The Blackfoot Tribe and Confederated Salish and Kootenai Tribes, located in western Montana, have wolf management plans which can be found here respectively: <http://blackfeetfishandwildlife.net/blackfoot-tribe-wolf-management-plan/> and <https://csktnrd.org/wildlife/projects/cskt-wolf-management>.

### **Secondary Impacts**

Under the proposed action, there would be long-term, negligible, secondary impacts on *Cultural Uniqueness and Diversity*. Many Montanans have chosen to live in Montana because of the wild and natural character of the landscape and associated wildlife. The proposed action would not change Montana's landscape in any way. Therefore, the proposed action would not be expected to result in the relocation of people within or out of the affected area. Wolf management can have positive secondary impacts to *Cultural Uniqueness and Diversity* because habitat management for wolves limits disturbance of habitats for all species. Management to limit new residential, commercial, and industrial developments ensures there is protected suitable habitat for a diversity of wildlife.

### **Cumulative Impacts**

Under the proposed action, there would be long-term, negligible, cumulative impacts on *Cultural Uniqueness and Diversity*. Wolf management can have positive cumulative impacts to *Cultural Uniqueness and Diversity* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term, negligible, and cumulative.

## 3.13 HUMAN POPULATION RESOURCE 12: ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES

### 3.13.1 INTRODUCTION

This section provides an overview of the *Access to and Quality of Recreational and Wilderness Activities* within the analysis area and the governing regulatory authorities.

Wolves occur in many areas where humans recreate, including fishing, hunting/trapping, camping, hiking, river floating, skiing, snowmobiling, wildlife viewing and sightseeing opportunities. Neither alternative restricts access to recreational and wilderness activities, and thus no impact would be expected. However, both alternatives may impact the *Quality of Recreational and Wilderness Activities*. The presence and densities of wolves in Montana is a polarizing subject reflecting strong, passionate views across a wide spectrum of attitudes and perspectives, from protection of wolves at any cost to complete elimination of wolves from the Montana landscape. It is clear, Montanans have a wide diversity of values about wolves; therefore, implementation of a statewide wolf management plan, under either alternative, aims to capture a wide breadth of perspectives. See “Values associated with wolves: benefits and challenges of wolf presence in Montana” for more information (**Chapter 3, Section 3.1.3**). The presence and densities of wolves in Montana can directly or indirectly add or detract from the *Quality of Recreational and Wilderness Activities* (e.g., wildlife viewing to big game harvest opportunities) depending on the individual intrinsic appreciation of the specific recreational or wilderness activity. Further, either alternative poses safety concerns in regards to harvest regulations and the impacts on pets and recovery species, which thereby influence the *Quality of Recreational and Wilderness Activities*.

Under both alternatives, a statewide management plan and its implementation will ensure wolf population sustainability in Montana. Wolves will be managed at levels sufficient to maintain recovered populations under either alternative. Wolf management can have impacts to *Access to and Quality of Recreational and Wilderness Activities* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Access to and Quality of Recreational and Wilderness Activities* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Access to and Quality of Recreational and Wilderness Activities* is described above in **Chapter 3, Section 3.1.3**.

## 3.13.2 ENVIRONMENTAL CONSEQUENCES

### 3.13.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Access to and Quality of Recreational and Wilderness Activities*. Wolves will continue to inhabit the analysis area and will have no new impact on *Access to and Quality of Recreational and Wilderness Activities* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Access to and Quality of Recreational and Wilderness Activities* due to current and future activities in the existing area would continue. Adjustments to *Access to and Quality of Recreational and Wilderness Activities* will be necessary under either alternative as state laws, policies, rules, and regulations, as well as overall sociopolitical environments, inevitably change.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

FWP would expect wolf abundances, population distribution, and events of wolf-livestock conflict to remain stable with the current harvest regulations. Wolves could potentially impact local recruitment of wild ungulates. FWP would continue to provide outreach and education to minimize wolf-livestock conflict, as well as mitigate conflict response using lethal and non-lethal methods. The benchmark of a *minimum* of 15 breeding pairs or 450 wolves (or whatever stated minimum threshold if modified, in coordination with the USFWS benchmark for relisting) would be maintained and FWP would continue to use regulated harvest as a wildlife management tool. Under the *No Action Alternative*, little would change compared with the current situation. With ESA delisting of wolves, authority of wolf management was given to the state, thereby FWP would continue to manage wolves in Montana.

Wolf management can have positive secondary and cumulative impacts to *Access to and Quality of Recreational and Wilderness Activities* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Continued focus on habitat management and conflict prevention actions as described in the 2003 Wolf Plan can provide a positive secondary and cumulative impact to other game or predator populations due to overlap with their respective conservation and management issues. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.13.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no direct impacts on the *Access* component of *Access to and Quality of Recreational and Wilderness Activities*. Wolves will continue to inhabit Montana and will have some short-term direct impacts on the *Quality* component of *Access to and Quality of Recreational and Wilderness Activities* in the areas where they occur. Direct impacts could be beneficial or adverse, or minor or significant depending on a particular individual's beliefs and values. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Access to and Quality of Recreational and Wilderness Activities* due to current and future activities in the existing area would continue.

#### **Secondary Impacts**

Under the proposed action, there would be long-term, secondary impacts on *Quality of Recreational and Wilderness*. Secondary impacts could be beneficial or adverse, or minor or significant depending on a particular individual's beliefs and values. Conservation of wolves and their habitat will benefit multiple species and landscapes that contribute to the *Access to and Quality of Recreational and Wilderness Activities* of the analysis area. Some people place intrinsic value on the potential to view wolves in the wild or knowing they are there, thereby enhancing the *Quality of Recreational and Wilderness Activities*. Some people will never accept wolves being present in an area (e.g., due to indirect decreased harvest opportunities of game), thereby diminishing the *Quality of Recreational and Wilderness Activities*. FWP decisions or actions made within the sideboards of the 2023 Wolf Plan could impact *Access to and Quality of Recreational and Wilderness Activities* for some people. However, wolf management can have positive secondary impacts to *Access to and Quality of Recreational and Wilderness Activities* because habitat management for wolves limits disturbance of habitats for all species. See "Values associated with wolves: benefits and challenges of wolf presence in Montana" for more information (**Chapter 3, Section 3.1.3**).

#### **Cumulative Impacts**

Under the proposed action, there would be short- and long-term, cumulative impacts on *Quality of Recreational and Wilderness Activities*. Cumulative impacts could be beneficial or adverse, minor or significant depending on a particular individual's beliefs and values. Impacts on *Quality of Recreational*

*and Wilderness Activities* will be dependent on the individual person and how they view the presence of wolves based on their personal preferences based in history, lifestyle, and beliefs. FWP decisions or actions made within the sideboards of the 2023 Wolf Plan could impact *Access to and Quality of Recreational and Wilderness Activities* for some people. However, wolf management can have positive cumulative impacts to *Access to and Quality of Recreational and Wilderness Activities* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. See “Values associated with wolves: benefits and challenges of wolf presence in Montana” for more information (**Chapter 3, Section 3.1.3**).

An impact of the 2023 Wolf Plan and sustainable management of wolves for population viability and longevity on the *Quality of Recreational and Wilderness Activities* may be by providing increased harvest opportunities of big game (i.e., huntable prey species of wolves). Ungulate abundances, densities, and distributions are a result of a variety of factors, one of which may be predation. Therefore, a proposed alternative could assist in continuing to provide ample harvest opportunities and increased success for big game hunters. FWP does not assume trends in ungulate populations to be driven exclusively by wolf population dynamics, rather wolf population dynamics represent a single, albeit important element among many other variables impacting such trends. Harvest reports can be found at: <https://myfwp.mt.gov/fwpPub/harvestReports>.

Wolf trapping in Grizzly Bear Occupied Territory may also be impacted based on the grizzly bear densities and distribution. As the grizzly bear population expands, wolf trapping will not begin in those areas until the floating season begins, thus potentially impacting proponents and opponents of wolf trapping.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be short- and long-term and cumulative.

## 3.14 HUMAN POPULATION RESOURCE 13: LOCAL AND STATE TAX BASE AND TAX REVENUE

### 3.14.1 INTRODUCTION

This section provides an overview of the *Local and State Tax Base and Tax Revenue* (i.e., government revenue) within the analysis area and the governing regulatory authorities.

Wolf presence may impact *Local and State Tax Base and Tax Revenue* where development is proposed, if employees are needed for mitigation or management, based on hunter harvest opportunities, or when businesses such as restaurants and hotels are used by wildlife viewers or hunters. Wolves prey on livestock opportunistically, resulting in impacts to agricultural producers from loss of livestock. Additionally, wolf management can have impacts to *Local and State Tax Base and Tax Revenue* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Local and State Tax Base and Tax Revenue* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Local and State Tax Base and Tax Revenue* is described above in **Chapter 3, Section 3.1.3**.

### 3.14.2 ENVIRONMENTAL CONSEQUENCES

#### 3.14.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Local and State Tax Base and Tax Revenue*. Wolves will continue to inhabit the analysis area and will have no new impact on *Local and State Tax Base and Tax Revenue* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Local and State Tax Base and Tax Revenue* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of

wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

FWP would expect wolf abundances, population distribution, and events of wolf-livestock conflict to remain stable with the current harvest regulations. Wolves could potentially impact local recruitment of wild ungulates. FWP would continue to provide outreach and education to minimize wolf-livestock conflict, as well as mitigate conflict response using lethal and non-lethal methods. The benchmark of a *minimum* of 15 breeding pairs or 450 wolves (or whatever stated minimum threshold if modified, in coordination with the USFWS benchmark for relisting) would be maintained and FWP would continue to use regulated harvest as a wildlife management tool. Under the *No Action Alternative*, little would change compared with the current situation. With ESA delisting of wolves, authority of wolf management was given to the state, thereby FWP would continue to manage wolves in Montana.

Wolf management can have positive secondary and cumulative impacts to *Local and State Tax Base and Tax Revenue* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Continued focus on habitat management and conflict prevention actions as described in the 2003 Wolf Plan can provide a positive secondary and cumulative impact to other game or predator populations due to overlap with their respective conservation and management issues. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.14.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no new direct impacts on *Local and State Tax Base and Tax Revenue*. Wolves will continue to inhabit Montana and will have no direct impacts on *Local and State Tax Base and Tax Revenue* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the *No Action Alternative* (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on

*Local and State Tax Base and Tax Revenue* due to current and future activities in the existing area would continue.

### **Secondary Impacts**

Under the proposed action, there would be no new secondary impacts on *Local and State Tax Base and Tax Revenue*.

### **Cumulative Impacts**

Under the proposed action, there would be long-term, cumulative impacts on *Local and State Tax Base and Tax Revenue*. Cumulative impacts could be beneficial or adverse, or minor or significant depending on the subject matter. Wildlife viewing and appreciation can bring visitors to Montana (**Chapter 3.11**). For example, regarding the Montana 4% Lodging Facility Use Tax Collection, Yellowstone and Glacier Counties make up almost 75% of contributions (Montana Dept. of Commerce: <https://ceic.mt.gov/Industry/Tourism>). However, wildlife can also decrease profitability and tolerance of local agricultural businesses, particularly livestock operations (**Chapter 3.15**). Further, predators can decrease harvest opportunities of game species for hunters and trappers (**Chapter 3.13**). Wolf management can have positive cumulative impacts to *Local and State Tax Base and Tax Revenue* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. All licensing, expenditures, and habitat projects (see figures and tables in **Chapter 2.4** and **Chapter 3.2**) have taxes associated with them.

Wildlife enthusiasts and or hunters and trappers for a variety of species contribute to local economies. See “Values associated with wolves: benefits and challenges of wolf presence in Montana” for more information (**Chapter 3, Section 3.1.3**)

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term and cumulative.

## 3.15 HUMAN POPULATION RESOURCE 14: AGRICULTURE, INDUSTRIAL, OR COMMERCIAL PRODUCTION

### 3.15.1 INTRODUCTION

This section provides an overview of the *Agriculture, Industrial, or Commercial Production* within the analysis area and the governing regulatory authorities.

Wolf presence may impact industrial and commercial activity if wolves occur in an area where industrial or commercial development is proposed. Developers may have to consult with FWP and or the USFS/BLM to minimize and mitigate take for activities such as energy development, timber management, and manufacturing. For some that would preclude development. Wolves prey on livestock opportunistically, resulting in impacts to agricultural producers from loss of livestock and often removal of the offending wolf or pack. FWP utilizes proactive (i.e., non-lethal) and reactive (i.e., lethal) control tools to mitigate wolf-livestock conflict, employs wolf specialists that are stationed throughout the state, and partners with federal agencies such as the USFWS and WS. Although wolves are often associated with negative connotations in regards to those whose livelihoods are in the *Agriculture, Industrial, or Commercial Production* sectors, a statewide management plan and its implementation will ensure population sustainability in Montana under either alternative. Wolves will be managed at levels sufficient to maintain recovered populations under either alternative. Wolf management can have impacts to *Agriculture, Industrial, or Commercial Production* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Agriculture, Industrial, or Commercial Production* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Agriculture, Industrial, or Commercial Production* is described above in **Chapter 3, Section 3.1.3**.

### 3.15.2 ENVIRONMENTAL CONSEQUENCES

#### 3.15.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Agriculture, Industrial, or Commercial Production*. Wolves will continue to inhabit the analysis area and will have no new impact on *Agriculture, Industrial, or Commercial Production* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Agriculture, Industrial, or Commercial Production* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

FWP would expect wolf abundances, population distribution, and events of wolf-livestock conflict to remain stable with the current harvest regulations. Wolves could potentially impact local recruitment of wild ungulates. FWP would continue to provide outreach and education to minimize wolf-livestock conflict, as well as mitigate conflict response using lethal and non-lethal methods. The benchmark of a *minimum* of 15 breeding pairs or 450 wolves (or whatever stated minimum threshold if modified, in coordination with the USFWS benchmark for relisting) would be maintained and FWP would continue to use regulated harvest as a wildlife management tool. Under the *No Action Alternative*, little would change compared with the current situation. With ESA delisting of wolves, authority of wolf management was given to the state, thereby FWP would continue to manage wolves in Montana.

Wolf management can have positive secondary and cumulative impacts to *Agriculture, Industrial, or Commercial Production* because proactive (i.e., non-lethal) and reactive (i.e., lethal) control tools to mitigate wolf-livestock conflict would continue.

### **3.15.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no new direct impacts on *Agriculture, Industrial, or Commercial Production*. Wolves will continue to inhabit Montana and will have no direct impacts on *Agriculture, Industrial, or Commercial Production* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in

regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Agriculture, Industrial, or Commercial Production* due to current and future activities in the existing area would continue.

### **Secondary Impacts**

Under the proposed action, there would be long-term, secondary impacts on *Agriculture, Industrial, or Commercial Production*. Secondary impacts could be beneficial or adverse, or minor or significant depending on a particular individual's or company's beliefs and values. Wolf presence may impact industrial and commercial activity if wolves occur in an area where industrial or commercial development is proposed. Developers may have to consult with FWP and or the USFS/BLM to minimize and mitigate take for activities such as energy development, timber management, and manufacturing. For some that would preclude development. Wolves prey on livestock opportunistically, resulting in impacts to agricultural producers from loss of livestock and often removal of the offending wolf or pack. FWP utilizes proactive (i.e., non-lethal) and reactive (i.e., lethal) control tools to mitigate wolf-livestock conflict, employs wolf specialists that are stationed throughout the state, and partners with federal agencies such as the USFWS and WS. Although wolves are often associated with negative connotations in regards to those whose livelihoods are in the *Agriculture, Industrial, or Commercial Production* sectors, it is expected that some people will never accept wolves being present in an area. Therefore, FWP decisions or actions made within the sideboards of the 2023 Wolf Plan could impact *Agriculture, Industrial, or Commercial Production* for some people. See "Values associated with wolves: benefits and challenges of wolf presence in Montana" for more information (**Chapter 3, Section 3.1.3**).

### **Cumulative Impacts**

Under the proposed action, there would be long-term, cumulative impacts on *Agriculture, Industrial, or Commercial Production*. Cumulative impacts could be beneficial or adverse, or minor or significant depending on the subject matter. Wolf presence may impact industrial and commercial activity if wolves occur in an area where industrial or commercial development is proposed. Developers may have to consult with FWP and or the USFS/BLM to minimize and mitigate take for activities such as energy development, timber management, and manufacturing. For some that would preclude development. Wolves prey on livestock opportunistically, resulting in impacts to agricultural producers from loss of livestock and often removal of the offending wolf or pack. FWP utilizes proactive (i.e., non-lethal) and reactive (i.e., lethal) control tools to mitigate wolf-livestock conflict, employs wolf specialists that are stationed throughout the state, and partners with federal agencies such as the USFWS and WS. Although wolves are often associated with negative connotations in regards to those whose livelihoods are in the *Agriculture, Industrial, or Commercial Production* sectors, it is expected that some people will never accept wolves being present in an area. Therefore, FWP decisions or actions made within the sideboards of the 2023 Wolf Plan could impact *Agriculture, Industrial, or Commercial Production* for some people. See "Values associated with wolves: benefits and challenges of wolf presence in Montana" for more information (**Chapter 3, Section 3.1.3**). Livestock lost and associated costs related to wolf-livestock conflict can be found in **Chapter 2.4.1**.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service

- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term and cumulative.

## 3.16 HUMAN POPULATION RESOURCE 15: HUMAN HEALTH

### 3.16.1 INTRODUCTION

This section provides an overview of the *Human Health* within the analysis area and the governing regulatory authorities.

Either alternative of a statewide management plan and its implementation do not affect the overall *Human Health* of an area since wolves have saturated much of the landscape in all suitable habitat, occurring throughout western Montana, and yet are rarely seen by the public. Wolves could impact human safety via direct attacks, although this has yet to occur in Montana. Statute ensures commitment to continuance of human safety (§ 87-1-217, MCA). While encounters with humans are possible, impacts to individual human health are negligible. Zoonotic diseases from a bite (e.g., rabies), or via a vector (e.g., tick-borne illnesses) are highly unlikely. Wolves and domestic dogs are susceptible to several canine diseases, however, most are treatable through veterinary care of pets and are more detrimental to the health of individual wolves and packs. Lastly, and perhaps more importantly, wolf management can influence ungulate population dynamics and distributions, and thereby the probability of wildlife-vehicle collisions (Gilbert et al. 2017).

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Human Health* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Human Health* is described above in **Chapter 3, Section 3.1.3**.

## **3.16.2 ENVIRONMENTAL CONSEQUENCES**

### **3.16.2.1 Alternative 1 – No Action**

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Human Health*. Wolves will continue to inhabit the analysis area and will have no new impact on *Human Health* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Human Health* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts to *Human Health* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.16.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no direct impacts on *Human Health*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Human Health* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action

Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Human Health* due to current and future activities in the existing area would continue.

### **Secondary Impacts**

Under the proposed action, there would be no new secondary impacts on *Human Health*.

### **Cumulative Impacts**

Under the proposed action, there would be short- and long-term, negligible, cumulative impacts on *Human Health*. Wolf management can have positive cumulative impacts to *Human Health* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Wolf management has the potential to indirectly impact *Human Health* via wildlife-vehicle collisions. Ungulates are commonly involved in wildlife-vehicle collisions. In the last decade, white-tailed deer (about 38,392 and 66%) and mule deer (about 14,041 and 24%) were involved in the vast majority of all wildlife-vehicle collisions (MDT Carcass Database, personal communication). FWP does not assume these trends to be directly associated with wolf population dynamics.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be short- and long-term, negligible, and cumulative.

## 3.17 HUMAN POPULATION RESOURCE 16: QUANTITY AND DISTRIBUTION OF EMPLOYMENT

### 3.17.1 INTRODUCTION

This section provides an overview of the *Quantity and Distribution of Employment* within the analysis area and the governing regulatory authorities.

Wolf presence may impact *Quantity and Distribution of Employment* as employees are needed for wildlife mitigation or management, as well as when businesses such as restaurants and hotels are used by wildlife viewers and hunters or when livestock producers need ranch hands to monitor wolf-livestock conflict. Land protection for wolf conservation in some areas limits certain types of employment. FWP employs staff for wildlife and conflict management. However, wolves have saturated much of the landscape in all suitable habitat, occurring throughout western Montana. Overall, implementation of a statewide management plan from either alternative would have little impact on the *Quantity and Distribution of Employment* which will be mostly maintained. These impacts could influence those in **Chapter 3.18** as they are related.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Quantity and Distribution of Employment* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Quantity and Distribution of Employment* is described above in **Chapter 3, Section 3.1.3**.

### 3.17.2 ENVIRONMENTAL CONSEQUENCES

#### 3.17.2.1 Alternative 1 – No Action

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Quantity and Distribution of Employment*. Wolves will continue to inhabit the analysis area and will have no new impact on *Quantity and Distribution of Employment* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Quantity and Distribution of Employment* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts to *Quantity and Distribution of Employment* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.17.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no new direct impacts on *Quantity and Distribution of Employment*. Wolves will continue to inhabit Montana and will have no direct impacts on *Quantity and Distribution of Employment* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Quantity and Distribution of Employment* due to current and future activities in the existing area would continue.

#### **Secondary Impacts**

Under the proposed action, there would be no new secondary impacts on *Quantity and Distribution of Employment*.

#### **Cumulative Impacts**

Under the proposed action, there would be short- and long-term, negligible, cumulative impacts on *Quantity and Distribution of Employment*. Wolf management can have positive cumulative impacts to

*Quantity and Distribution of Employment* because wolf presence could provide employment as needed for wildlife mitigation or management, as well as when businesses such as restaurants and hotels are used by wildlife viewers and hunters or when livestock producers need ranch hands to monitor wolf-livestock conflict. Changing wolf densities and distribution could require an increase or decrease in ranching staff to livestock owners. Additional or fewer staff may be desired to sufficiently survey land, ensure intact fencing, and range-ride to prevent conflict. The impact of staff needing housing would be negligible as this fluctuation would be minor.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be short- and long-term, negligible, and cumulative.

## **3.18 HUMAN POPULATION RESOURCE 17: DEMANDS FOR GOVERNMENT SERVICES**

### **3.18.1 INTRODUCTION**

This section provides an overview of the *Demands for Government Services* within the analysis area and the governing regulatory authorities.

Wolf management is driven by state and interagency plans that focus on the habitat needs of wolves, providing recreational opportunity for consumptive (hunting/trapping of big game and furbearer species) and non-consumptive users (wildlife viewing, eco-tourism), and wolf-livestock conflict management (using lethal and non-lethal strategies) for population viability and longevity. A statewide management plan from either alternative would necessitate continued and ongoing government management of wolves. Government management of wolves under either alternative would be accomplished within the normal scope of duties conducted by affected government agencies, federal, state, or local.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Demands for Government Services* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Demands for Government Services* is described above in **Chapter 3, Section 3.1.3**.

## **3.18.2 ENVIRONMENTAL CONSEQUENCES**

### **3.18.2.1 Alternative 1 – No Action**

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Demands for Government Services*. Wolves will continue to inhabit the analysis area and will have no new impact on *Demands for Government Services* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Demands for Government Services* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts on *Demands for Government Services* because habitat management for wolves benefits multiple species and landscapes by limiting

disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.18.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no new direct impacts on *Demands for Government Services*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Demands for Government Services* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Demands for Government Services* due to current and future activities in the existing area would continue.

#### **Secondary Impacts**

Under the proposed action, there would be no new secondary impacts on *Demands for Government Services*.

#### **Cumulative Impacts**

Under the proposed action of adopting and implementing a statewide plan, there would be long-term, negligible, cumulative impacts on *Demands for Government Services*. Counties and local governments may hire new employees to assist with fencing wolves out of public community areas or instituting methods to haze wolves (horns, sirens). Additional employee hours may be desired to remove attractants on a more consistent basis or to institute safe protocols or measures. Increased police presence may be desired to haze or handle wolves when they do move through human-developed and settlement areas.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant

entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term and negligible.

## **3.19 HUMAN POPULATION RESOURCE 18: DISTRIBUTION AND DENSITY OF POPULATION AND HOUSING**

### **3.19.1 INTRODUCTION**

This section provides an overview of the *Distribution and Density of Population and Housing* within the analysis area and the governing regulatory authorities.

Planning and zoning laws based on the needs of humans, wildlife and the environment generally drive housing development. Implementation of a statewide management plan from either alternative would have negligible impacts on the *Distribution and Density of Population and Housing*. Wolf management can have some impacts to *Distribution and Density of Population and Housing* because habitat management for wolves limits disturbances and new developments in high quality and suitable habitats that provide benefits for a diversity of fish and wildlife, as well as the greater landscape.

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Distribution and Density of Population and Housing* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Distribution and Density of Population and Housing* is described above in **Chapter 3, Section 3.1.3**.

### **3.19.2 ENVIRONMENTAL CONSEQUENCES**

#### **3.19.2.1 Alternative 1 – No Action**

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact *Distribution and Density of Population and Housing*. Wolves will continue to inhabit the analysis area and will have no new impact on *Distribution and Density of Population and Housing* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Distribution and Density of Population and Housing* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts to *Distribution and Density of Population and Housing* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.19.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no new direct impacts on *Distribution and Density of Population and Housing*. Wolves will continue to inhabit Montana and will have no direct impacts on *Distribution and Density of Population and Housing* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Distribution and Density of Population and Housing* due to current and future activities in the existing area would continue.

#### **Secondary Impacts**

Under the proposed action, there would be no new secondary impacts on *Distribution and Density of Population and Housing*.

## Cumulative Impacts

Under the proposed action, there would be short- and long-term, negligible, cumulative impacts on *Distribution and Density of Population and Housing*. Wolf management can have positive cumulative impacts to *Distribution and Density of Population and Housing* because wolf presence could provide employment as needed for wildlife mitigation or management, as well as when businesses such as restaurants and hotels are used by wildlife viewers and hunters or when livestock producers need ranch hands to monitor wolf-livestock conflict. These employees would need housing and would influence the distribution and density of the human population. Wolf presence may limit distribution of housing or diminish human populations out of fear of conflict and negative interactions.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses. Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be short- and long-term, negligible, and cumulative.

## 3.20 HUMAN POPULATION RESOURCE 19: LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS

### 3.20.1 INTRODUCTION

This section provides an overview of the *Locally Adopted Environmental Plans and Goals* within the analysis area and the governing regulatory authorities.

Wolf management is driven by state and interagency plans that focus on the habitat needs of wolves, providing recreational opportunity for consumptive (hunting/trapping of big game and furbearer species) and non-consumptive users (wildlife viewing), and wolf-livestock conflict management (using lethal and non-lethal strategies) for population viability and longevity. A statewide management plan

from either alternative would honor existing environmental plans and goals related to other issues so long as they fall within the legal constraints of wolf management (e.g., harvest regulations).

This section also analyzes the environmental consequences, including the direct, secondary, and cumulative impacts, of the No Action Alternative (Alternative 1) and the proposed action (Alternative 2) with respect to *Locally Adopted Environmental Plans and Goals* in the analysis area.

For regulatory framework, other related, past, present, and future actions as they relate to the aforementioned resources, unavoidable adverse impacts, and irreversible and irretrievable impacts of this resource, refer to **Chapter 3, Section 3.1.2**.

The analysis area (Montana) for direct, secondary, and cumulative impacts on *Locally Adopted Environmental Plans and Goals* is described above in **Chapter 3, Section 3.1.3**.

## **3.20.2 ENVIRONMENTAL CONSEQUENCES**

### **3.20.2.1 Alternative 1 – No Action**

The “No Action” alternative forms the baseline from which the potential impacts of the proposed action (Alternative 2) can be measured. Under the No Action Alternative, the proposed alternative would not occur and none of the disturbances associated with the proposed actions would therefore impact on *Locally Adopted Environmental Plans and Goals*. Wolves will continue to inhabit the analysis area and will have no new impact on *Locally Adopted Environmental Plans and Goals* where they occur. The No Action Alternative would not change the status of the existing area. Impacts on *Locally Adopted Environmental Plans and Goals* due to current and future activities in the existing area would continue.

Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

Wolf management can have positive secondary and cumulative impacts to on *Locally Adopted Environmental Plans and Goals* because habitat management for wolves benefits multiple species and landscapes by limiting disturbance and new developments, and thereby maintains a healthy ecosystem. Habitat conditions that are compatible with long-term population stability will be maintained.

### **3.20.2.2 Alternative 2 – Proposed Action**

#### **Direct Impacts**

Under the proposed action, there would be no new direct impacts on *Locally Adopted Environmental Plans and Goals*. Wolves will continue to inhabit Montana and will have no new direct impacts on *Locally Adopted Environmental Plans and Goals* in the areas where they occur. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as provide increased transparency and understanding to the public and capture a diversity of values in regards to wolves in Montana. The proposed action would not change the status of the existing area. Impacts on *Locally Adopted Environmental Plans and Goals* due to current and future activities in the existing area would continue.

#### **Secondary Impacts**

Under the proposed action, there would be no secondary impacts on *Locally Adopted Environmental Plans and Goals*.

#### **Cumulative Impacts**

Under the proposed action of adopting and implementing a statewide plan, there would be long-term, negligible, cumulative impacts on *Locally Adopted Environmental Plans and Goals*. Adoption of the statewide management plan may influence the plans of other local and state government agencies and entities.

Current wolf management strategies in Montana are guided collectively by various related past, present and future actions conducted by federal and state land/resource managers, as follows:

- U.S. Department of Agriculture – Forest Service
- U.S. Department of Interior – National Park Service
- U.S. Department of Interior – U.S. Fish & Wildlife Service
- U.S. Department of Interior – Bureau of Land Management
- Montana Department of Natural Resources and Conservation
- Montana Department of Fish, Wildlife, and Parks and Fish and Wildlife Commission
- Idaho Department of Fish and Game; Idaho Fish and Game Commission
- Wyoming Game and Fish Department; Wyoming Game and Fish Commission

The 2023 Wolf Plan would be expected to contribute to cumulative wolf management impacts associated with the above-listed entities/strategies. For a more detailed discussion of the relevant entities/strategies listed above see § 3.1.4, Actions Considered in the Cumulative Impacts Analyses.

Wolves inhabit various habitats of Montana and would continue to inhabit these same areas under the proposed action. Cumulative impacts associated with the proposed action, with consideration for any impacts associated with the management strategies implemented by the federal and state land/resource managers listed above, would be long-term and negligible.

# CHAPTER 4. REGULATORY RESTRICTIONS

## 4.1 REGULATORY RESTRICTIONS OF PRIVATE PROPERTY

MEPA requires state agencies to evaluate regulatory restrictions proposed on private property rights as a result of state actions, including an analysis of alternatives that reduce, minimize, or eliminate the regulation of private property (MCA 75-1-201(1)(b)(iii)). Alternatives and mitigation measures required by federal or state laws and regulations to meet minimum environmental standards, as well as actions proposed by or consented to by the applicant, are not subject to a regulatory restrictions analysis.

The 2023 Wolf Plan would create no additional regulatory restrictions on private property as it is a management plan that provides guidance to FWP for the management of wolves. Similar to the management of other species, FWP would respect private property rights and work with landowners only through voluntary agreements relative to wildlife or habitat management. Habitat conservation agreements such as habitat leases would be vetted through appropriate approval processes that involve the commission and/or the State Board of Land Commissioners.

### **No Action Alternative**

The 2003 Wolf Plan does not create any additional regulatory restrictions on private property as it is a management plan that provides guidance to FWP for the management of wolves. Under the No Action Alternative, there would be no changes to wolf management in Montana, FWP would continue to manage wolves as described in the 2003 Wolf Plan. Therefore, no additional impacts to the physical environment or human population in the state would occur.

FWP has demonstrated successful management of wolves through the creation and implementation of the 2003 Wolf Plan, which serves as the backbone for the 2023 Wolf Plan. Although annual wolf reports have been published since the adoption of the 2003 Wolf Plan, as a means to provide transparency of wolf monitoring and management, the 2003 Wolf Plan fails to provide details on how wolves are currently monitored and managed cohesively. While the 2003 Wolf Plan allows for contemporaneous and scientific approaches to wolf management as well as flexibility to changing biological and sociopolitical environments, ultimately allowing FWP to monitor and manage wolves using the methods and tools employed today, it does not describe the history of the Montana wolf population and the evolution of how FWP monitors and manages wolves since its publication. More specifically, the 2003 Wolf Plan does not address recent research regarding monitoring methods and management strategies (e.g., iPOM, surveys on wolf tolerance, non-lethal preventative strategies), the authority of WS in making wolf-livestock conflict decisions, current population status and trends, changes in harvest structure and statutes, new tools to provide public information (i.e., dashboards), the transition of the population metric from breeding pairs to number of individuals, among other notable differences. Over the last 20 years, the wolf population has recovered and remained stable, withstanding a series of continually evolving harvest seasons adopted by the commission and new statutes developed through legislative action. Further, FWP has considered complex varying opinions on wolf monitoring and management, via public engagement processes, incorporating them as allowed within our legal bounds and as monitoring and management tools became available and were practically implementable to us.

FWP would expect wolf abundances, population distribution, and events of wolf-livestock conflict to remain stable with current harvest regulations. Wolves could potentially impact local recruitment of wild ungulates. FWP would continue to provide outreach and education to minimize wolf-livestock

conflict, as well as mitigate conflict response using lethal and non-lethal methods. The benchmark of a *minimum* of 150 wolves and 15 breeding pairs (USFWS benchmark for relisting) would be maintained and FWP would continue to use regulated harvest as a wildlife management tool. Direction would be articulated in the 2003 Wolf Plan for private lands, and FWP recognizes the pivotal role private landowner support and their lands play in wolf population viability and longevity.

**Proposed Action**

The 2023 Wolf Plan would create no additional regulatory restrictions on private property (Table 13) as it is a management plan that provides guidance to FWP for the management of wolves. Under the proposed action, wolf management would look mostly the same as with the No Action Alternative (i.e., the 2003 Wolf Plan) except that it would incorporate current science as it becomes available and is most practical with implementable strategies, improved monitoring methods, changes in harvest management tools, or updated depredation response and mitigation (involving lethal and non-lethal strategies), as well as ensure continued public transparency and understanding while capturing a diversity of values regarding wolves in Montana. FWP would acknowledge the contribution that private lands make in providing habitat for wolves, and prioritize aid to landowners to minimize conflicts wherever they might occur.

Table 13. Private Property Assessment Act (Taking and Damaging Assessment)

PRIVATE PROPERTY ASSESMENT ACT (PPAA)			
Does the Proposed Action Have Takings Implications under the PPAA?	Question #	Yes	No
Does the project pertain to land or water management or environmental regulations affecting private property or water rights?	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the action result in either a permanent or an indefinite physical occupation of private property?	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the action deprive the owner of all economically viable uses of the property?	3	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the action require a property owner to dedicate a portion of property or to grant an easement? (If answer is NO, skip questions 4a and 4b and continue with question 5)	4	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there a reasonable, specific connection between the government requirement and legitimate state interest?	4a	<input type="checkbox"/>	<input type="checkbox"/>
Is the government requirement roughly proportional to the impact of the proposed use of the property?	4b	<input type="checkbox"/>	<input type="checkbox"/>
Does the action deny a fundamental attribute of ownership?	5	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the action have a severe impact of the value of the property?	6	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the action damage the property by causing some physical disturbance with respect to the property in excess of that sustained by the public general? (If the answer is NO, skip questions 7a-7c.)	7	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is the impact of government action direct, peculiar, and significant?	7a	<input type="checkbox"/>	<input type="checkbox"/>
Has the government action resulted in the property becoming practically inaccessible, waterlogged, or flooded?	7b	<input type="checkbox"/>	<input type="checkbox"/>

Has the government action diminished property values by more than 30% and necessitated the physical taking of adjacent property or property across a public way from the property in question?	7c	<input type="checkbox"/>	<input type="checkbox"/>
<b>Does the proposed action result in taking or damaging implications?</b>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Taking or damaging implications exist if <b>YES</b> is checked in response to Question 1 and also to any one or more of the following questions: 2, 3, 4, 6, 7a, 7b, 7c; or if <b>NO</b> is checked in response to question 4a or 4b.			
If taking or damaging implications exist, the agency must comply with MCA § 2-10-105 of the PPAA, to include the preparation of a taking or damaging impact assessment. Normally, the preparation of an impact assessment will require consultation with agency legal staff.			
<p><b>Alternatives:</b></p> <p>The analysis under the Private Property Assessment Act, §§ 2-10-101 through -112, MCA, indicates no impact. FWP does not plan to impose conditions that would restrict the regulated person's use of private property to constitute a taking.</p>			

# CHAPTER 5. COORDINATION AND CONSULTATION

## 5.1 CONSULTATION PROCESS

During the public scoping process, as well as through consultation and coordination throughout the preparation of this DEIS, formal and informal efforts were made by FWP to involve appropriate federal and state agencies, local governments, tribes, and members of the public. This consultation and coordination with multiple stakeholders was important to ensure the most appropriate data were gathered for analysis and to ensure agency and public interests were considered by decision-makers. This chapter provides a summary of the formal consultation processes that occurred during the preparation of the DEIS and provides the distribution list for the DEIS.

### 5.1.1 Public Comment Process

The draft 2023 Wolf Plan is written in the context of an existing FWP plan (2003 Wolf Plan), years of inter-agency collaboration on wolf conservation, previous state and inter-agency plans, routine interactions with the public during FWP's day-to-day management and research, a human dimensions public attitude survey, internal SDM process, and robust opportunity for public comment during various stages of development of the 2023 Wolf Plan. These internal and public processes are considered to have fulfilled the scoping requirements of MEPA. **Chapter 1** provides a complete summary of the public scoping process for this DEIS. **Chapter 1** also describes the issue identification process, specifically identifying key issues and nonsignificant issues eliminated from detailed analysis (Chapter 1, Section 1.5.2). **Chapter 2** describes alternatives considered but dismissed from further consideration (Chapter 2.5).

### 5.1.2 Tribal Consultation

Development of the 2023 Wolf Plan required consulting and incorporating the guidance and rules from a variety of existing federal and state plans. At the ecosystem level, Native American tribes whose lands include wolf habitat have been involved in development of those strategies through direct personal contact and consultation. Eight Tribal affiliations were notified of and invited to consult on the 2023 Wolf Plan and associated DEIS: Blackfeet Tribe of the Blackfeet Indian Reservation of Montana, Confederated Salish and Kootenai Tribes of the Flathead Reservation, Chippewa Cree Tribe of Rocky Boy's Reservation, Fort Peck Assiniboine and Sioux Tribes of Fort Peck Indian Reservation, Crow Tribe of Crow Indian Reservation, Little Shell Tribe of Chippewa Indians of Montana, and Northern Cheyenne Tribe and Indian Reservation. Additional emails were sent to alert the Tribes and follow-up calls were made later in the comment period. To date, no concerns were communicated by any Tribe. Further consultation with the Tribes will be pursued in accordance with Section 106 of the NHPA (54 USC § 306108) and its implementing regulations (36 CFR Part 800).

### 5.1.3 Federal, State, and Local Agency Consultation

Completion of the 2023 Wolf Plan required consulting and incorporating guidance and rules from a variety of existing federal and state plans. All actions FWP takes must be consistent with protocols and

procedures of the USFWS to maintain the viability and longevity of wolves, and thereby prevent wolves from being relisted under the ESA. Management of wolves are under state authority, in which FWP monitors (i.e., population surveillance and estimation) and manages (i.e., harvest strategies) the wolf population, mitigates conflict including livestock depredation and other problem wolf control (using lethal and non-lethal methods), coordinates and authorizes research with a variety of partners, conducts public outreach and education, and utilizes the best available and most practical science with implementable strategies in these efforts.

### ***Montana Code Annotated (MCA)***

This DEIS and 2023 Wolf Plan have been written to be compliant and consistent with MEPA (Title 75, Parts 1 through 3, MCA), following guidelines produced by Stockwell (2021). This DEIS and plan have been written to be compliant and consistent with elements of MCA that refer to big game, predators, and wolves specifically:

§ 87-6-214, MCA, Unlawful contest or prize;

§ 87-6-106, MCA, Lawful taking to protect livestock or person;

§ 87-6-401, MCA, Unlawful use of equipment while hunting;

§ 87-1-217, MCA, Policy for management of large predators;

§ 87-1-304, MCA, Fixing of seasons and bag and possession limits;

§ 87-1-901, MCA, Gray wolf management – rulemaking – reporting;

§ 87-1-601, MCA, Use of fish and game money;

§ 87-1-623, MCA, Wolf management account;

§ 87-1-625, MCA, Funding for wolf management;

§ 87-1-708, MCA, Assent to Pittman-Robertson Act;

§ 87-2-101, MCA, Definitions;

§ 87-2-813, MCA, Auction or lottery wolf license;

§ 87-2-104, MCA, Number of licenses, permits, or tags allowed – fees;

§ 87-2-523, MCA, Class E-1 – Resident Wolf License; § 87-2-524, MCA, Class E-2 – Nonresident Wolf License;

§ 2-15-3110, MCA, Livestock loss board – purpose, membership, and qualifications;

§ 2-15-3111, MCA, Livestock loss reduction program;

§ 2-15-3112, MCA, Livestock loss mitigation program – definitions;

§ 2-15-3113, MCA, Additional powers and duties of livestock loss board;

§ 81-1-110, MCA, Livestock loss reduction and mitigation accounts;  
§ 81-1-111, MCA, Livestock loss reduction and mitigation trust fund; and  
§ 81-7-123, MCA, Voluntary wolf mitigation account.

### ***Administrative Rules of Montana (ARM)***

This DEIS and statewide plan have been written to be compliant and consistent with elements of the ARM with relevance to wolves, specifically:

ARM 12.9.1301, Commitment to Preservation of the Gray Wolf as Resident Wildlife in Need of Management;

ARM 12.9.1302, Definitions;

ARM 12.9.1303, Control Methods of the Gray Wolf Include Nonlethal and Lethal Means;

ARM 12.9.1304, Allowable Nonlethal Control of the Gray Wolf; and

ARM 12.9.1305, Allowable Lethal Control of the Gray Wolf.

### ***Relationship of this Plan to Interagency Cooperative Plans***

#### **Tri-state and USFWS MOU**

The commission entered into a MOU with the wildlife Commissions of Wyoming and Idaho, as well as the USFWS, to maintain consistent monitoring of wolf genetics for population viability and connectivity. See **Chapter 1, Section 1.2.1** for more information on the wolf genetics analysis conducted from 2005-2017. This DEIS and the 2023 Wolf Plan are fully consistent with that MOU. Inter-state collaborations and analysis on wolf genetics may occur under an updated MOU in the future.

#### **FWP-USDA-WS MOU**

In November 2022, FWP renewed a MOU with WS outlining a cooperative program for management of wildlife damage from grizzly bears, wolves, black bears, and mountain lions in Montana. For wolves, the importance of this MOU is largely to clarify that investigations of possible livestock depredations will be the responsibility of WS (in cooperation with FWP when possible). See **Chapter 2, Section 2.4.1** for more information on the MOU with WS.

#### **U.S. Forest Service Plans**

As the USFS is the manager of the largest single land-ownership category in western Montana, decisions made by the USFS have great influence on wolf management and conservation. National Forests lands are incorporated by reference in the 2023 Wolf Plan.

#### **Relationship of this Plan to Existing State Plans**

*Montana Gray Wolf Conservation and Management Plan (2003)*. This statewide management plan was formally adopted in 2004 and FWP began consistent implementation of the 2003 Wolf Plan in 2011. The 2023 Wolf Plan, when/if approved under the DEIS and formally adopted by the commission, will supersede the 2003 Wolf Plan.

## 5.2 DEIS DISTRIBUTION

This DEIS has been prepared by FWP to analyze and disclose the potential environmental impacts of adopting and implementing the 2023 Wolf Plan. According to the applicable requirements of ARM 12.2.439, *Time limits and distribution of Environmental Impact Statements*, following preparation of a DEIS, the agency shall distribute copies to the Governor, EQC, other affected state agencies, and the public for opportunity to comment. Copies must also be sent to interested parties and (i.e., persons who have requested copies). An EIS is a public document and may be inspected upon request. Any person may obtain a copy of the DEIS by making a request to FWP.

To fulfill the public participation requirements of MEPA, this DEIS has been distributed through the following methods:

- Public notice has been served on the Montana Fish, Wildlife & Parks website at: [wolf-  
https://fwp.mt.gov/aboutfwp/public-comment-opportunities/wolf-management-plan](https://fwp.mt.gov/aboutfwp/public-comment-opportunities/wolf-management-plan)
- Public notice has been served on the EQC's MEPA Document List website at: <https://leg.mt.gov/mepa/search/>.
- Public notice has been sent to the Governor of Montana
- Public notice has been sent to the Montana Department of Agriculture, Department of Environmental Quality, Department of Livestock, Department of Natural Resources and Conservation
- Public notice has been sent to the United States Department of Agriculture's (USDA) Forest Service (USFS), Animal and Plant Inspection Service - Wildlife Services (APHIS-WS), and the Natural Resource Conservation Service (NRCS)
- Public notice has been sent to the Department of the Interior's (DOI) Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), and Bureau of Reclamation (BOR), and the Fish and Wildlife Service (USFWS)
- FWP maintains a mailing list of persons interested in a particular action or type of action. FWP has notified all interested persons and alerted them to this public comment opportunity. The interested persons mailing list is available upon request from FWP.
- FWP has issued a press release to media outlets across Montana to include radio and television stations, and more than 70 newspapers. This outreach includes reporters and web-based media outlets as well.
- For more information on how to submit comments on this EIS electronically, visit: <https://fwp.mt.gov/aboutfwp/public-comment-opportunities/draft-wolf-mgmt-plan>

# CHAPTER 6. LIST OF PREPARERS

## 6.1 MONTANA FISH, WILDLIFE AND PARKS<sup>1</sup>

NAME	RESPONSIBILITIES	EDUCATION	EXPERIENCE
Samantha Fino	Primary drafter of EIS and 2023 Wolf Plan	PhD Wildlife Science	8 years of wildlife management experience
Molly Parks	EIS and 2023 Wolf Plan	MS Wildlife Biology	11 years of wildlife management experience
Brian Wakeling	EIS and 2023 Wolf Plan	MS Wildlife Biology	35 years of wildlife management experience
Justin Gude	EIS and 2023 Wolf Plan	MS Fish & Wildlife Management	25 years of wildlife management and research experience
Ken McDonald	EIS and 2023 Wolf Plan	MS Wildlife Biology	>30 years of wildlife management experience
Eric Merchant	MEPA Coordinator	BS, Biology, MS, Public Health	24 years of public service

<sup>1</sup>Several other FWP biologists, managers, specialists, and coordinators contributed to the materials (i.e., data, figures, tables, maps) presented in the EIS and 2023 Wolf Plan. These include: Lindsey Parsons (Deer and Elk Coordinator), Alix Godar (Population ecologist/biometrician), Nick DeCesare (Research Biologist), Kevin Podruzny (Biometrician), Cara Whalen (GIS Specialist), Alex Scolavino (Legal Counsel), Sarah Clerget (Legal Counsel), Kqyn Kuka (Tribal Liaison), Brenna Moloney (Natural Heritage), Rachel Reckin (Natural Heritage), Payton Schild (Licensing Business Analyst), Rick Northrup (Wildlife Habitat Bureau Chief), Jason Parke (Forester), James Colegrove (Lands Specialist), Austin Wieseler (Wildlife Health Biologist), Greg Lemon (CommEd), Peggy O’Neill-McLeod (CommEd), Missy Erving (CommEd), among many others. Additionally, wolf specialists (Wendy Cole, Tyler Parks, Nathan Lance, Subhadeep Bhattacharjee, and Sarah Zielke) as well as wildlife and regional managers (Warren Hansen, Marina Yoshioka, Neil Anderson, Lee Anderson, Liz Bradley, Randy Arnold, Cory Loecker, Gary Bertellotti, Scott Thompson, Drew Henry, Brett Dorak, Brad Schmitz) assisted on writing and including details within the plan.

## **6.2 OTHER STATE, FEDERAL AGENCY, AND TRIBAL PERSONNEL**

Deb Wambach (Montana Dept. of Transportation, Environmental Services Bureau), Dr. Sarah Sells (University of Montana, Montana Cooperative Wildlife Research Unit), Kenneth Mills (Large Carnivore Biologist, Wyoming Game and Fish Department), Katie Oelrich (Large Carnivore Coordinator, Idaho Department of Fish and Game), Scott Becker (US Fish and Wildlife Service), Dalin Tidwell (Wildlife Services), Kraig Glazier (Wildlife Services), and George Edwards (Montana Livestock Loss Board).

Eight Tribal affiliations were notified of and invited to consult on this plan and associated EIS: Blackfeet Tribe of the Blackfeet Indian Reservation of Montana, Confederated Salish and Kootenai Tribes of the Flathead Reservation, Chippewa Cree Tribe of Rocky Boy's Reservation, Fort Peck Assiniboine and Sioux Tribes of Fort Peck Indian Reservation, Crow Tribe of Crow Indian Reservation, Little Shell Tribe of Chippewa Indians of Montana, and Northern Cheyenne Tribe and Indian Reservation.

## CHAPTER 7. REFERENCES

- Adams, L. G., R. O. Stephenson, B. W. Dale, R. T. Ahgook, and D. J. Demma. 2010. Population Dynamics and Harvest Characteristics of Wolves in the Central Brooks Range, Alaska. *Wildlife Monographs* 170:1-25.
- Akenson, J., H. Akenson, and H. Quigley. 2005. Effects of wolf reintroduction on a cougar population in the central Idaho wilderness. Pages 177-187 in *Proceedings of the 8th Mountain Lion Workshop*. Washington Department of Fish and Wildlife, 17-19 May 2005, Leavenworth, Washington, USA.
- Arjo, W. M., D. H. Pletscher, and R. R. Ream. 2002. Dietary Overlap Between Wolves and Coyotes in Northwestern Montana. *Mammalogy* 83:754-766.
- Atwood, T. C., E. M. Gese, and K. E. Kunkel. 2007. Comparative patterns of predation by cougars and recolonizing wolves in Montana's Madison Range. *Journal of Wildlife Management* 71:1098-1106.
- Ausband, D. E. and L. Waits. 2020. Does harvest affect genetic diversity in grey wolves? *Molecular Ecology* 29:3187-3195.
- Ausband, D. E., M. S. Mitchell, C. R. Stansbury, J. L. Stenglein, and L. P. Waits. 2017. Harvest and group effects on pup survival in a cooperative breeder. *Proceedings of the Royal Society of London B: Biological Sciences* 284:20170580.
- Ballard, W. B., J. S. Whitman, and C. L. Gardner. 1987. Ecology of an exploited wolf population in south-central Alaska. *Wildlife Monographs* 98:3-54.
- Ballard, W. B., D. Lutz, T. W. Keegan, L. H. Carpenter, and J. C. deVos Jr. 2001. Deer-Predator Relationships: A Review of Recent North American Studies with Emphasis on Mule and Black-Tailed Deer. *Wildlife Society Bulletin* 29:99-115.
- Ballard, W. B., L. N. Carbyn, and D. W. Smith. 2003. Wolf interactions with non-prey. Pages 259-271 in D. L. Mech and L. Boitaini, editors. *Wolves: behavior, ecology, and conservation*. The University of Chicago Press, Chicago, Illinois, USA.
- Bangs, E., M. Jimenez, C. Niemeyer, J. Fontaine, M. Collinge, R. Krsichke, L. Handegard, J. A. Shivik, C. Sime, S. Nadeau, et al. 2006. Non-Lethal and Lethal Tools to Manage Wolf-Livestock Conflict in the Northwestern United States. *Proceedings of the Vertebrate Pest Conference*, 22. <http://dx.doi.org/10.5070/V422110170>.
- Bangs, E. E., S. H. Fritts, J. A. Fontaine, D. W. Smith, K. M. Murphy, C. M. Mack, and C. C. Niemeyer. 1998. Status of gray wolf restoration in Montana, Idaho, and Wyoming. *Wildlife Society Bulletin* 26:785-798.
- Barber-Meyer, S. M., D. L. Mech, and P. J. White. 2008. Elk calf survival and mortality following wolf restoration to Yellowstone National Park. *Wildlife Monographs* 169:1-30.
- Barber-Meyer, S. M., T. J. Wheeldon, and L. D. Mech. 2021. The importance of wilderness to wolf (*Canis lupus*) survival and cause-specific mortality over 50 years. *Biological Conservation* 258:109145.
- Bassing, S. B. 2017. Harvest and persistence of wolf populations: variable effects of harvest on wolf packs in the Rocky Mountains. Thesis, University of Montana, Missoula, MT, USA.

- Bassing, S.B., D.E. Ausband, M.S. Mitchell, M. Schwartz, and L. Waits. 2020. Immigration does not offset harvest mortality in a cooperatively breeding carnivore. *Animal Conservation* 23:750–761.
- Bassing, S. B., D. E. Ausband, M. S. Mitchell, P. Lukacs, A. C. Keever, G. Hale, and L. Waits. 2019. Stable pack abundance and distribution in a harvested wolf population. *The Journal of Wildlife Management* 83:577–590.
- Batcheller, G. R., M. C. Bambery, L. Bles, T. Decker, S. Dyke, D. Guynn, M. McEnroe, M. O'Brien, J. F. Organ, S. J. Riley, and G. Roehm. 2010. The Public Trust Doctrine: Implications for Wildlife Management and Conservation in the United States and Canada. *The Wildlife Society by Worthy Shorts, Inc., Bethesda, MD, USA.*
- Berger, K. M. and E. M. Gese. 2007. Does interference competition with wolves limit the distribution and abundance of coyotes? *Journal of Animal Ecology* 76:1075-1085.
- Berger, K. M., E. M. Gese, and J. Berger. 2008. Indirect effects and traditional trophic cascades: a test involving wolves, coyotes, and pronghorn. *Ecology* 89:818-828.
- Beschta, R. L., and W. J. Ripple. 2009. Large predators and trophic cascades in terrestrial ecosystems of the western United States. *Biological Conservation* 142:2401-2414.
- Beschta, R. L., and W. J. Ripple. 2006. River channel dynamics following extirpation of wolves in northwestern Yellowstone National Park, USA. *Earth Surface Processes and Landforms: The Journal of the British Geomorphological Research Group* 31:1525-1539.
- Bilyeu, D. M., D. J. Cooper, and N. T. Hobbs. 2008. Water tables constrain height recovery of willow on Yellowstone's northern range. *Ecological Applications* 18:80-92.
- Bischof, R., C. Milleret, P. Dupont, J. Chipperfield, M. Tourani, A. Ordiz, P. de Valpine, D. Turek, J. A. Royle, O. Gimenez, Ø. Flagstad, M. Åkesson, L. Svensson, H. Brøseth, and J. Kindberg. 2020. Estimating and forecasting spatial population dynamics of apex predators using transnational genetic monitoring. *Proceedings of the National Academy of Sciences* 117:30531–30538.
- Boertje, R. D., and R. O. Stephenson. 1992. Effects of ungulate availability on wolf reproductive potential in Alaska. *Canadian Journal of Zoology* 70:2441-2443.
- Borg, B. L., S. M. Brainerd, T. J. Meier, and L. R. Prugh. 2014. Impacts of breeder loss on social structure, reproduction and population growth in a social canid. *Journal of Animal Ecology* 84:177-187.
- Boyd-Heger, D. K. 1997. Dispersal, genetic relationships, and landscape use by colonizing wolves in the central Rocky Mountains. PhD dissertation, University of Montana. 184pp.
- Boyd, D. K., D. E. Ausband, H. D. Cluff, J. R. Heffelfinger, J. W. Hinton, B. R. Patterson, and A. P. Wydeven. 2023. Chapter 32: North American Wolves. In T. L. Hiller, R. D. Applegate, R. D. Bluett, S. N. Frey, E. M. Gese, and J. F. Organ, editors, *Wild furbearer management and conservation in North America*, 72 pgs. Wildlife Ecology Institute, Helena, MT, USA. <https://doi.org/10.59438/FYHC8935>.
- Boyd, D. K and D. H. Pletscher. 1999. Characteristics of dispersal in a colonizing wolf population in the central Rocky Mountains. *Journal of Wildlife Management* 63(4):1094-1108.

- Boyd, D. K., R. R. Ream, D. H. Pletscher, and M. W. Fairchild. 1993. Variation in denning and parturition dates of a wild gray wolf, *Canis lupus*, in the Rocky Mountains. *Canadian Field Naturalist* 107(3):359-360.
- Boyd, D., P. C. Pacquet, S. Donelon, R. R. Ream, D. H. Pletscher, and C. C. White. 1995. Transboundary movements of a recolonizing wolf population in the Rocky Mountains. Pages 135-140 in L. Carbyn, S. Fritts, and D. Seip, eds. *Ecology and management of wolves in a changing world*. Canadian Circumpolar Institute, University of Alberta, Edmonton.
- Boyd, D. K., S. H. Forbes, D. H. Pletscher, and F. W. Allendorf. 2001. Identification of Rocky Mountain gray wolves. *Wildlife Society Bulletin* 29(1):78-85.
- Bradshaw, L., B. Beardmore, M. Henry, A. Scott, R. Holsman, and D. J. Watermolen. 2022. *Public Opinions Regarding Wolves and Wolf Management in Wisconsin*. Technical Report to the Bureau of Wildlife Management, Wisconsin Dept. of Natural Resources, Madison, WI, USA.
- Brandell, E. E., P. C. Cross, D. W. Smith, W. Rogers, N. L. Galloway, D. R. MacNulty, D. R. Stahler, J. Treanor, and P. J. Hudson. 2022. Examination of the interaction between age-specific predation and chronic disease in the Greater Yellowstone Ecosystem. *Journal of Animal Ecology* 91: 1373-1384.
- Bradley, E. H., D. H. Pletscher, E. E. Bangs, K. E. Kunkel, D. W. Smith, C. M. Mack, T. J. Meier, J. A. Fontaine, C. C. Niemeyer, and M. D. Jimenez. 2005. Evaluating translocation as a nonlethal method to reduce livestock conflicts in the Northwestern United States. *Conservation Biology* 19(5): 1498-1508.
- Bradley, E. H., and D. H. Pletscher. 2010. Assessing factors related to wolf depredation of cattle in fenced pastures in Montana and Idaho. *Wildlife Society Bulletin* 33:1256-1265.
- Bradley, E. H., H. S. Robinson, E. E. Bangs, K. Kunkel, M. D. Jimenez, J. A. Gude, and T. Grimm. 2015. Effects of wolf removal on livestock depredation recurrence and wolf recovery in Montana, Idaho, and Wyoming. *Journal of Wildlife Management* 79:1337-1346.
- Brainerd, S. M., H. Andren, E. E. Bangs, E. H. Bradley, J. A. Fontaine, W. Hall, Y. Iliopoulos, M. D. Jimenez, E. A. Jozwiak, O. Liberg, et al. 2008. The Effects of Breeder Loss on Wolves. *Journal of Wildlife Management* 72:89-98.
- Bright, A. D. and M. J. Manfredi, 1996. A conceptual model of attitudes toward natural resource issues: a case study of wolf reintroduction. *Human Dimensions of Wildlife* 1:1-21.
- Brodie, J., H. Johnson, M. Mitchell, P. Zager, K. Proffitt, M. Hebblewhite, M. Kauffman, B. Johnson, J. Bissonette, C. Bishop, J. Gude, J. Herbert, K. Hersey, M. Hurley, P. M. Lukacs, S. McCorquodale, E. McIntire, J. Nowak, H. Sawyer, D. Smith, and P. J. White. 2013. Relative influence of human harvest, carnivores, and weather on adult female elk survival across western North America. *Journal of Applied Ecology* 50:295–305.
- Brooks, S. P. 2003. Bayesian computation: a statistical revolution. *The Royal Society* 361:2681–2697.
- Brown, J. S., J. W. Laundre, and M. Gurung. 1999. The ecology of fear: optimal foraging, game theory, and trophic interactions. *Journal of Mammalogy* 80:385-399.

- Bruns, A., M. Waltert, and I. Khorozyan. 2020. The effectiveness of livestock protection measures against wolves (*Canis lupus*) and implications for their co-existence with humans. *Global Ecology and Conservation* 21: e00868.
- Bump, J. K., R. O. Peterson, and J. A. Vucetish. 2009. Wolves modulate soil nutrient heterogeneity and foliar nitrogen by configuring the distribution of ungulate carcasses. *Ecology* 90: 3159-3167.
- Bunnefeld, N., E. Hoshino, and E. J. Milner-Gulland. 2011. Management strategy evaluation: a powerful tool for conservation? *Trends in Ecology and Evolution* 26:441–447.
- Cascaddan, B. 2016. Contribution of Large Ungulates to Gray Wolf (*Canis lupus*) Diet and How This Relates to Predator-Prey Dynamics: A Case Study in the Bitterroot Valley, Montana. Undergraduate Thesis, Montana State University, Bozeman, MT, USA.
- Cassidy, K. A., B. L. Borg, K. J. Klauder, M. S. Sorum, R. Thomas-Kuzilik, S. R. Dewey, J. A. Stephenson, D. R. Stahler, T. D. Gable, J. K. Bump, et al. 2023. Human-caused mortality triggers pack instability in gray wolves. *Frontiers in Ecology and the Environment* doi:10.1002/fee.2597.
- Cassidy, K. A., D. W. Smith, D. R. Stahler, E. Stahler, M. Metz, J. SunderRaj, M. Jackson, W. Binder, C. Meyer, T. Bland, B. Cassidy, J. Rabe, and N. Tatton. 2022. Yellowstone National Park Wolf Project Annual Report 2021. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, WY, USA, YCR-2022-04.
- Cassidy, K. A., L. D. Mech, D. R. MacNulty, D. R. Stahler, D. W. Smith. 2017. Sexually dimorphic aggression indicates male gray wolves specialize in pack defense against conspecific groups. *Behavioural Processes* 136:64-72.
- Chapron, G. and A. Treves. 2016. Blood does not buy goodwill: allowing culling increases poaching of a large carnivore. *Proceedings of the Royal Society Bulletin* 283: 20152939.
- Clark, T. J., and M. Hebblewhite. 2020. Predator control may not increase ungulate populations in the future: A formal meta-analysis. *Journal of Applied Ecology* 58:812-824.
- Crabtree, R. L. and J. W. Sheldon. 1999. The ecological role of coyotes on Yellowstone's northern range. *Yellowstone Science* 7:15-24.
- Creel, S., and J. A. Winnie, Jr. 2005. Responses of elk herd size to fine-scale spatial and temporal variation in the risk of predation by wolves. *Animal Behavior* 69:1181-1189.
- Creel, S., and J. J. Rotella. 2010. Meta-analysis of relationships between human offtake, total mortality and population dynamics of gray wolves (*Canis lupus*). *PLoS ONE* 5:e12918.
- Creel, S., D. Christianson, S. Liley, and J. A. Winnie, Jr. 2007. Predation risk affects reproductive physiology and demography of elk. *Science* 315:960.
- Creel, S., D. A. Christianson, and J. A. Winnie, Jr. 2011. A survey of the effects of wolf predation risk on pregnancy rates and calf recruitment in elk. *Ecological Applications* 21:2847-2853.
- Creel, S., J. A. Winnie, Jr., and D. Christianson. 2009. Glucocorticoid stress hormones and the effect of predation risk on elk reproduction. *Proceedings of the National Academy of Sciences* 106:12388-12393.

- Creel, S., J. A. Winnie, Jr., B. Maxwell, K. Hamlin, and M. Creel. 2005. Elk alter habitat selection as an antipredator response to wolves. *Ecology* 86:3387– 3397.
- Creel, S., J. A. Winnie, Jr., D. Christianson., and S. Liley. 2008. Time and space in general models of antipredator response: tests with wolves and elk. *Animal Behavior* 76:1139-1146.
- Crête, M. 1999. The distribution of deer biomass in North America supports the hypothesis of exploitation ecosystems. *Ecology Letters* 2:223-227.
- Cupples, J. B. 2013. Wolf Literature Review and Research Recommendations. Oregon Department of Fish and Wildlife, Salem, OR, 97303.
- Davidson-Nelson, S. J., and T. M. Gehring. 2010. Testing Fladry as a Nonlethal Management Tool for Wolves and Coyotes in Michigan. *Human-Wildlife Interactions* 4 DOI: <https://doi.org/10.26077/mdky-bs63>.
- DeCesare, N. J., C. Peterson, and R. Harris. 2022. Vital rates, limiting factors and monitoring methods for moose in Montana. Annual Report for Federal Aid in Wildlife Restoration Grant W-157-R-7. Montana Fish, Wildlife and Parks, Helena, Montana.
- DeCesare, N. J., C. Peterson, T. Hayes, C. Anton, D. Messmer, T. Chilton-Radandt, B. Lonner, E. Lula, T. Thier, N. Anderson, C. Loecker, C. Bishop, and M. Mitchell. 2021. Montana statewide mule deer study: ecology of mule deer in northern forests and integrated population modeling in the prairie-breaks. Final Report for Federal Aid in Wildlife Restoration Grant W-167-R. Montana Fish, Wildlife and Parks, Helena, Montana, USA.
- DeCesare, N. J., S. M. Wilson, E. H. Bradley, J. A. Gude, R. M. Inman, N. J. Lance, K. Laudon, A. A. Nelson, M. S. Ross, and T. D. Smucker. 2018. Wolf-livestock conflict and the effects of wolf management. *Journal of Wildlife Management* 82(4):711-722.
- Derbridge, J. 2010. Summer wolf diet in northwestern Montana. Graduate Student Theses, Dissertations, & Professional Papers. 934.
- Derbridge, J. J., P. R. Krausman, and C. T. Darimont. 2012. Using Bayesian stable isotope mixing models to estimate wolf diet in a multi-prey ecosystem. *Journal of Wildlife Management* 76:1277-1289.
- Despain, D. 2005. Alternative hypothesis for willow growth. In: Proceedings of the 8th biennial scientific conference on the greater Yellowstone ecosystem. Yellowstone National Park, Wyoming, USA.
- Donadio, E. and S. W. Buskirk. 2006. Diet, morphology, and interspecific killing in Carnivora. *American Naturalist* 167:524-536.
- Duda, M. D., M. Jones, T. Beppler, S. J. Bissell, A. Center, A. Criscione, P. Doherty, G. L. Hughes, C. Gerken, and A. Lanier. 2019. Washington residents' attitudes toward wolves and wolf managements: 2008-2019. Responsive Management National Office, Harrisonburg, VA, USA.
- Duffield, J., C. Neher, and D. Patterson. 2006. Wolves and People in Yellowstone: Impacts on the Regional Economy. University of Montana, Missoula, MT, USA.
- Duffield, J., D. Patterson, and C. Neher. 1993. Wolves and people in Yellowstone: a case study in the new resource economics. Report to the Liz Claiborne and Art Ortenberg Foundation. New York, New York. 52 pp.

- Duman, B. 2001. Differentiating Great Lakes Area native wild wolves from dogs and wolf-dog hybrids. Earth Voices, LLC. Howel, Michigan. 35pp.
- Eacker, D. R., M. Hebblewhite, K. M. Proffitt, B. Jimenez, M. S. Mitchell, and H. S. Robinson. 2016. Landscape-level effects of risk factors on annual elk calf survival in a multiple carnivore system. *Journal of Wildlife Management* 80:1345–1359.
- Elbroch, L. M., L. Marescot, H. Quigley, D. Craighead, and H. U. Wittmer. 2018. Multiple anthropogenic interventions drive puma survival following wolf recovery in the Greater Yellowstone Ecosystem. *Ecology and Evolution* 8:7236-7245.
- Elbroch, L. M., P. E. Lendrum, M. L. Allen, and H. U. Wittmer. 2015. Nowhere to hide: pumas, black bears, and competition refuges. *Behavioral Ecology* 26:247–254.
- Elbroch, L. M., J. M. Ferguson, H. Quigley, D. Craighead, D. J. Thompson, and H. U. Wittmer. 2020. Reintroduced wolves and hunting limit the abundance of a subordinate apex predator in a multi-use landscape. *Proceedings of the Royal Society B* 287:20202202.
- Erb, J., C. Humpal, and B. Sampson. 2018. Distribution and abundance of wolves in Minnesota, 2017-18. Volume 1. St. Paul, USA. <<https://files.dnr.state.mn.us/wildlife/wolves/2018/survey-wolf.pdf>>.
- Eriksson, M., C. Sandstrom, and G. Ericsson. 2015. Direct experience and attitude change towards bears and wolves. *Wildlife Biologist* 21:131-137.
- Estes, J. A. 1996. Predators and ecosystem management. *Wildlife Society Bulletin*. 24(3):390-396.
- Fish Wildlife and Parks [FWP]. 2023. Targeted Elk Brucellosis Surveillance Project 2022 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana. 16 pages.
- Fish Wildlife and Parks [FWP]. 2022. FWP Forestry Program: Report to the 68th Montana Legislature. Montana Fish, Wildlife & Parks. Helena, Montana. 35 pages.
- Fish Wildlife and Parks [FWP]. 2018. Montana Gray Wolf Conservation and Management 2017 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana. 87 pages.
- Forbes, S. H. and D. K. Boyd. 1996. Genetic variation of naturally colonizing wolves in the Central Rocky Mountains. *Conservation Biology* 10:1082-1090.
- Forbes, S. H. and D. K. Boyd. 1997. Genetic structure and migration in native and reintroduced Rock Mountain wolf populations. *Conservation Biology* 11:1226-1234.
- Fortin, D., H. L. Beyer, M. S. Boyce, D. W. Smith, T. Duchesne, and J. S. Mao. 2005. Wolves influence elk movements: behavior shapes a trophic cascade in Yellowstone National Park. *Ecology* 86:1320-1330.
- Fritts, S. H., E. E. Bangs, and J. F. Gore. 1994. The relationship of wolf recovery to habitat conservation and biodiversity in northwestern United States. *Landscape and Urban Planning* 28:23-32.
- Fritts, S. H., E. E. Bangs, J. A. Fontaine, W. G. Brewster, and J. F. Gore. 1995. Restoring wolves to the northern Rocky Mountains of the United States. Pages 107-125 in L. Carbyn, S. Fritts, and D. Seip, eds. *Ecology and management of wolves in a changing world*. Canadian Circumpolar Institute, University of Alberta, Edmonton.

- Fritts, S. H. and L. N. Carbyn. 1995. Population viability, nature reserves, and the outlook for gray wolf conservation in North America. *Restoration Ecology* 3:26-28.
- Fuller, T. K. 1989. Population dynamics of wolves in north central Minnesota. *Wildlife Monographs* No. 105: 41pp.
- Fuller, T. K., L. D. Mech, and J. F. Cochrane. 2003. Wolf Population Dynamics. *Wolves: Behavior, Ecology, and Conservation*, edited by L. David Mech and Luigi Boitani. University of Chicago Press, Chicago, Illinois, USA.
- Frame, P. F., H. D., Cluff, and D. S. Hik. 2007. Wolf reproduction in response to caribou migration and industrial development on central barrens of mainland Canada. *Arctic* 81:134-142.
- Gable., T. D., S. K. Windels, J. G. Bruggink, S. M. Barber-Meyer. 2018. Weekly Summer Diet of Gray Wolves (*Canis lupus*) in Northeastern Minnesota. *The American Midland Naturalist* 179:15-27.
- Garrott, R. A., J. E. Bruggeman, M. S. Becker, S. T. Kalinowski, and P. J. White. 2007. Evaluating prey switching in wolf-ungulate systems. *Ecological Applications* 17: 1588-1597.
- Garrott, R. A., P. J. White, and J. J. Rotella. 2008. The Madison headwaters elk herd: transitioning from bottom-up regulation to top-down limitation. Pages 489–518 in R. A. Garrott, P. J. White, and F. G. R. Watson, editors. *The ecology of large mammals in central Yellowstone: 16 years of integrated studies*. Academic Press, New York, New York, USA.
- Gaynor, K. M., J. S. Brown, A. D. Middleton, M. E. Power, and J. S. Brashares. 2019. Landscapes of fear: Spatial patterns of risk perception and response. *Trends in Ecology & Evolution* 34:355– 368.
- Gehring, T. M., K. C. VerCauteren, M. L. Provost, and A. C. Cellar. 2010. Utility of livestock-protection dogs for deterring wildlife from cattle farms. *Wildlife Research* 37:715-721.
- George, K. A., K. M. Slagle, R. S. Wilson, S. J. Moeller, and J. T. Bruskotter. 2016. Changed in attitudes toward animals in the United States from 1978 to 2014. *Biological Conservation* 201:237-242.
- Gese, E. M., J. P. Hart, and P. A. Terletzky. 2021. *Wildlife Damage Management Technical Series: Gray Wolves*. U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services.
- Gilbert, S. L., K. J. Sivy, C. B. Pozzanghera, A. DuBour., K. Overduijn, M. M. Smith, J. Zhou, J. M. Little, and L. R. Prugh. 2016. Socioeconomic Benefits of Large Carnivore Recolonization Through Reduced Wildlife-Vehicle Collisions. *Conservation Letters* 10:431-439.
- Glenn, E.S., L.N. Rich, and M.S. Mitchell. 2011. Estimating numbers of wolves, wolf packs, and breeding pairs in Montana using hunter survey data in a patch occupancy model 27 framework: final report. Technical report, Montana Fish, Wildlife & Parks, Helena, Montana, USA.
- Griffin, K. A., M. Hebblewhite, H. S. Robinson, P. Zager, S. M. Barber-Meyer, D. Christianson, S. Creel, N. C. Harris, M. A. Hurley, D. H. Jackson, B. K. Johnson, W. L. Myers, J. D. Raithel, M. Schlegel, B. L. Smith, C. White, and P. J. White. 2011. Neonatal mortality of elk driven by climate, predator phenology and predator community composition. *Journal of Animal Ecology* 80:1246-1257.
- Godar, A., D. Messmer, and J. Gude. 2023. 2023-2027 Wolf Population Forecasting Report. Technical report, Montana Fish, Wildlife & Parks, Helena, Montana, USA.

- Gude, J. A., M. S. Mitchell, R. E. Russell, C. A. Sime, E. E. Bangs, L. D. Mech, and R. R. Ream. 2012. Wolf population dynamics in the U.S. Northern Rocky Mountains are affected by recruitment and human-caused mortality. *The Journal of Wildlife Management* 76:108–118.
- Gula, R. 2004. Influence of snow cover on wolf *Canis lupus* predation patterns in Bieszczady Mountains, Poland. *Wildlife Biology* 10:17-23.
- Headwaters Economics. 2020. Montana losing open space. Available at: <https://headwaterseconomics.org/economic-development/montana-home-construction/>
- Haber, G. 2012. *Among Wolves*. University of Alaska Press, Fairbanks, AK, USA.
- Hale, S. L. and J. L. Koprowski. 2018. Ecosystem-level effects of keystone species reintroduction: a literature review. *Restoration Ecology* 26:439-445.
- Hamlin, K. L. and J. A. Cunningham. 2009. Monitoring and assessment of wolf-ungulate interactions and population trends within the Greater Yellowstone Area, southwestern Montana, and Montana statewide: final report. Montana Department of Fish, Wildlife, and Parks, Wildlife Division, Helena, Montana, USA.
- Harper, E. K., W. J. Paul, and L. D. Mech. 2005. Causes of wolf depredation increase in Minnesota from 1979-1998. USGS Northern Prairie Wildlife Research Center: 95.
- Harper, E. K., W. J. Paul, L. D. Mech, and S. Weisberg. 2010. Effectiveness of Lethal, Directed Wolf-Depredation Control in Minnesota. *Journal of Wildlife Management* 72: 778-784.
- Harrington, F. H., and L. D. Mech. 1979. Wolf Howling and Its Role in Territory Maintenance. *Behaviour* 68:207-249.
- Harrington, F. H., L. D. Mech, and S. H. Fritts. 1983. Pack size and wolf pup survival: their relationship under varying ecological conditions. *Behavioral Ecology and Sociobiology*, 13:19-26.
- Hayes, R. D. and A. S. Harestad. 2000. Demography of a recovering wolf population in the Yukon. *Canadian Journal of Zoology* 78:36-48.
- Hebblewhite, M. 2005. Predation by wolves interacts with the North Pacific Oscillation (NPO) on a western North American elk population. *Journal of Animal Ecology* 74:226-233.
- Hebblewhite, M. and D. W. Smith. 2009. Wolf community ecology: ecosystem effects of recovering wolves in Banff and Yellowstone National Parks. Pages 69-120 in M. Musiani, L. Boitaini, and P. C. Paquet, editors. *The world of wolves: new perspectives on ecology, behavior, and policy*. University of Calgary Press, Calgary, Alberta, Canada.
- Hebblewhite, M., D. H. Pletscher, and P. C. Paquet. 2002. Elk population dynamics in areas with and without predation by recolonizing wolves in Banff National Park, Alberta. *Canadian Journal of Zoology* 80:789-799.
- Hogberg, J., A. Treves, B. Shaw, and L. Naughton-Treves. 2016. Changes in attitudes toward wolves before and after an inaugural public hunting and trapping seasons: early evidence from Wisconsin's wolf range. *Environmental Conservation* 43:45-55.

- Houston, D. B. 1973. Wildfires in northern Yellowstone National Park. *Ecology* 54:1111-1117.
- Houston, M. J., J. T. Bruskotter, and D. Fan. 2010. Attitudes Toward Wolves in the United States and Canada: A Content Analysis of the Print News Media, 1999–2008. *Human Dimensions of Wildlife* 15:389-403.
- Holyan, J., J. Husseman, J. Struthers, B. Thomas, J. Rachael, C. White, and C. Mack. 2013. 2012 Idaho Wolf Monitoring Progress Report.
- Horne, J. S., M. A. Hurley, C. G. White, and J. Rachael. 2019. Effects of wolf pack size and winter conditions on elk mortality. *Journal of Wildlife Management* 83:1103–1116.
- Huggard, D. J. 1993. Effect of snow depth on predation and scavenging by gray wolves. *The Journal of Wildlife Management* 57:382.
- Husseman, J. S., D. L. Murray, G. Power, C. Mack, C. R. Wenger, and H. Quigley. 2003. Assessing differential prey selection patterns between two sympatric large carnivores. *OIKOS*:591-601.
- Inman, B. 2018. Incidental Captures of Wildlife and Domestic Dogs in Montana, 2012-2017. Montana Department of Fish, Wildlife, and Parks, Helena, MT, USA.
- Inman, B., K. Podruzny, A. Nelson, D. Boyd, T. Parks, T. Smucker, M. Ross, N. Lance, W. Cole, M. Parks, and S. Wells. 2020. Montana Gray Wolf Conservation and Management 2019 Annual Report. Helena, Montana, USA.
- Inman, B., K. Podruzny, T. Parks, T. Smucker, M. Ross, N. Lance, W. Cole, M. Parks, S. Sells, and S. Wells. 2021. Montana Gray Wolf Conservation and Management 2020 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana, USA. 153 pages.
- Jedrzejewski, W., B. Jedrzejewski, H. Okarma, K. Schmidt, C. Zub, and M. Musiani. 2000. Prey selection and predation by wolves in BiaLowieZa Primeval Forest, Poland. *Journal of Mammalogy* 81: 197-212.
- Jimenez, M. D., E. E. Bangs, D. K. Boyd, D. W. Smith, S.A. Becker, D. E. Ausband, S. P. Woodruff, E. H. Bradley, J. Holyan, and K. Laudon. 2017. Wolf dispersal in the Rocky Mountains, Western United States: 1993–2008. *Journal of Wildlife Management* 81:581-592.
- Johnson, B. K., P. K. Coe, and R. L. Green. 2013a. Abiotic, bottom-up, and top-down influences on recruitment of Rocky Mountain elk in Oregon: a retrospective analysis. *Journal of Wildlife Management* 77:102–116.
- Karlsson, J. and M. Sjostrom. 2007. Human attitudes towards wolves, a matter of distance. *Biological Conservation* 137:610-616.
- Kauffman, M. J., J. F. Brodie, and E. S. Jules. 2010. Are wolves saving Yellowstone’s aspen? A landscape-level test of a behaviorally mediated trophic cascade. *Ecology* 91:2742-2755.
- Kauffman, M. J., N. Varley, D. W. Smith, D. R. Stahler, D. R. MacNulty, and M. S. Boyce. 2007. Landscape heterogeneity shapes predation in a newly restored predator-prey system. *Ecology Letters* 10:690-700.
- Keith, L. 1983. Population dynamics of wolves. Canadian Wildlife Service Report Series 45:66-77.
- Kellert, S. R., M. Black, C. R. Rush, and A. J. Bath. 1996. Human culture and large carnivore conservation in North America. *Conservation Biology* 10:977-990.

- Kinka, D., J.T. Schultz, and J.K. Young. 2021. Wildlife responses to livestock guard dogs and domestic sheep on open range. *Global Ecology and Conservation*: e01823.
- Klich, D., M. Sobczuk, S. M. Basak, I. A. Wierzbowska, A. Tallian, M. Hedrzak, B. Popczyk, and K. Zoch. 2021. Predation on livestock as an indicator of drastic prey decline? The indirect effects of an African swine fever epidemic on predator–prey relations in Poland. *Ecological Indicators* 133:108419.
- Kluge, N. 2023. Non-target Captures of Wildlife and Domestic Dogs in Montana, 2018-2022. Montana Department of Fish, Wildlife, and Parks, Helena, MT, USA.
- Kortello, A. D., T. E. Hurd, and D. L. Murray. 2007. Interactions between cougars (*Puma concolor*) and gray wolves (*Canis lupus*) in Banff National Park, Alberta. *Ecoscience* 14:214-222.
- Kunkel, K. E., T. K. Ruth, D. H. Pletscher, and M. G. Hornocker. 1999. Winter prey selection by wolves and cougars in and near Glacier National Park, Montana. *Journal of Wildlife Management* 63:901-910.
- Laundré, J. W., L. Hernández, and K. B. Altendorf. 2001. Wolves, elk, and bison: reestablishing the "landscape of fear" in Yellowstone National Park, U.S.A. *Canadian Journal of Zoology* 79:1401-1409.
- Lewis, M. S., A. L. Metcalf, E. C. Metcalf, C. Phelan, J. Gude, Q. Kujala, and B. Inman. 2018. Better Understanding Montanans Thoughts Regarding Wolves and Wolf Management in Montana. Summary of Research for HD Unit Research Summary No. 42. Montana Fish, Wildlife and Parks, Helena, Montana, USA.
- Llaneza, L., J. V. López-Bao, and V. Sazatornil. 2012. Insights into wolf presence in human-dominated landscapes: the relative role of food availability, humans and landscape attributes. *Diversity and Distributions* 18:459–469.
- Loonam, K. E., D. E. Ausband, P. M. Lukacs, M. S. Mitchell, and H. S. Robinson. 2020. Estimating abundance of an unmarked, low-density species using cameras. *Journal of Wildlife Management* 85:87–96.
- Manfredo, J. J., L. Sullivan, A. W. Don Carlos, A. M. Dietsch, T. L. Teel, A. D. Bright, and J. Bruskotter. 2018. America's Wildlife Values: The Social Context of Wildlife Management in the U.S. National report from the research project entitled "America's Wildlife Values". Fort Collins, CO. Colorado State University.
- Marasco, R. J., Goodman, D., Grimes, C.B., Lawson, P.W., Punt, A.E. and Quinn, T.J. II. 2007 Ecosystem Based Fisheries Management: some practical suggestions. *Canadian Journal of Fisheries and Aquatic Sciences* 64:928–939.
- Mech, L. D. 1970. *The wolf: the ecology and behavior of an endangered species*. University of Minnesota Press, Minneapolis. 384pp.
- Mech, L. D. 1995. The challenge and opportunity of recovering wolf populations. *Conservation Biology* 9:270-278.
- Mech, L. D. 2001. Managing Minnesota's recovered wolf population. *Wildlife Society Bulletin* 29:70–77.
- Mech, L. D., D. W. Smith, K. M. Murphy, and D. R. MacNulty 2001. Winter severity and wolf predation on a formerly wolf-free elk herd. *Journal of Wildlife Management* 65:998-1003.
- Mech, L. D., E. K. Harper, T. J. Meier, and W. J. Paul. 2000. Assessing Factors That May Predispose Minnesota Farms to Wolf Depredations on Cattle. *Wildlife Society Bulletin* 28:623-629.

- Mech, L. D., L. G. Adams, T. J. Meier, J. W. Burch, and B. W. Dale. 1998. *The Wolves of Denali*. University of Minnesota Press, Minneapolis, Minnesota.
- Mech, L. D., and J. Fieberg. 2015. Growth rates and variances of unexploited wolf populations in dynamic equilibria. *Wildlife Society Bulletin* 39:41–48.
- Mech, L. D., and L. Boitani. 2003. *Wolves: Behavior, Ecology and Conservation*. University Of Chicago Press, Chicago, Illinois, USA.
- Mech, L. D., and R. O. Peterson. 2003. Wolf-prey relations. Pages 131–160 in L. D. Mech and L. Boitani, editors. *Wolves: Behavior, Ecology and Conservation*. University Of Chicago Press, Chicago, Illinois, USA.
- Melis, C., B. Jędrzejewska, M. Apollonio, K. A. Bartoń, W. Jędrzejewski, J. D. C. Linnell, I. Kojola, J. Kusak, M. Adamic, S. Ciuti, I. Delehan, I. Dykyy, K. Krapinec, L. Mattioli, A. Sagaydak, N. Samchuk, K. Schmidt, M. Shkvryra, V. E. Sidorovich, B. Zawadzka, and S. Zhyla. 2009. Predation has a greater impact in less productive environments: variation in roe deer, *Capreolus capreolus*, population density across Europe. *Global Ecology and Biogeography* 18:724-734.
- Messmer, D. 2021. 2021 Wolf Population Forecasting Report. Technical report, Montana Fish, Wildlife & Parks, Helena, Montana, USA.
- Metz, M. C., D. W. Smith, J. A. Vucetich, D. R. Stahler, and R. O. Peterson. 2012. Seasonal patterns of predation for gray wolves in the multi-prey system of Yellowstone National Park. *Journal of Animal Ecology* 81:553-563.
- Middleton, A. 2012. The influence of large carnivore recovery and summer conditions on the migratory elk of Wyoming's Absaroka Mountains. Dissertation, University of Wyoming, Laramie, Wyoming, USA.
- Miller, D. A. W., J. D. Nichols, J. A. Gude, L. N. Rich, K. M. Podruzny, J. E. Hines, and M. S. Mitchell. 2013. Determining occurrence dynamics when false positives occur: estimating the range dynamics of wolves from public survey data. *PLoS ONE* 8:1–9.
- Mills, K. J. and D. Thompson. 2023. Estimating successful breeding pairs for wolves in the Northern Rocky Mountains. Manuscript in preparation.
- Mills, K. J., B. R. Patterson, and D. L. Murray. 2008. Direct Estimation of Early Survival and Movements in Eastern Wolf Pups. *Journal of Wildlife Management* 72: 949-954.
- Montana Department of Commerce. 2021. Montana Tourism Data: Card Spend 2021. <https://ceic.mt.gov/Industry/Tourism>.
- Montana Wolf Conservation and Management Planning Document. 2002. Rocky Mountain Wolf Recovery Annual Reports. 23.
- Morehouse, A. T. and M. S. Boyce. 2011. From venison to beef: seasonal changes in wolf diet composition in a livestock grazing landscape. *Frontiers in Ecology and the Environment* 9:440-445.
- Moreira-Arce, D., C. S. Ugarte, F. Zorondo-Rodriguez, and J. A. Simonetti. 2019. Management Tools to Reduce Carnivore-Livestock Conflicts: Current Gap and Future Challenges. *Rangeland Ecology and Management* 71: 389-394.

- Muhly, T. B. and M. Musiani. 2009. Livestock depredation by wolves and the ranching economy in the Northwestern U.S. *Ecological Economics* 68:2439-2450.
- Murray, D. L., D. W. Smith, E. E. Bangs, C. Mack, J. K. Oakleaf, J. Fontaine, D. Boyd, M. Jiminez, C. Niemeyer, T. J. Meier, D. Stahler, J. Holyan, V. J. Asher. 2010. Death from anthropogenic causes is partially compensatory in recovering wolf populations. *Biological Conservation* 143:2514-2524.
- Musiani, M., C. Mamo, L. Boitani, C. Callaghan, C. C. Gates, L. Mattei, E. Visalberghi, S. Breck, G. Volpi. 2003. Wolf Depredation Trends and the Use of Fladry Barriers to Protect Livestock in Western North America. *Conservation Biology* 17:1538-1547.
- National Park Service. 2016. Yellowstone National Park Visitor Use Study. US Department of Interior: [https://www.nps.gov/yell/getinvolved/upload/R-YELL\\_VUS\\_FINAL-Report.pdf](https://www.nps.gov/yell/getinvolved/upload/R-YELL_VUS_FINAL-Report.pdf).
- Naughton-Treves, L., R. Grossberg, and A. Treves. 2003. Paying for tolerance: rural citizens' attitudes toward wolf depredation and compensation. *Conservation Biology* 17:1500-1511.
- Newsome, T. M., L. Boitani, G. Chapron, P. Ciucci, C. R. Dickman, J. A. Dellinger, J. V. Lopez-Bao, R. O. Peterson, C. R. Shores, A. J. Wirsing, and W. J. Ripple. 2016. Food habits of the world's grey wolf. *Mammal Review* 46:255-269.
- Nickerson, N. P., J. L. Sage, K. Grau, and M. Schultz. 2019. *The Economic Review of the Travel Industry in Montana, 2018 Edition*. Institute for Tourism and Recreation Research, University of Montana, Missoula, USA.
- Niemiec, R., R. E. W. Berl, M. Gonzalez, T. Teel, C. Camara, M. Collins, J. Salerno, K. Crooks, C. Schultz, S. Breck, and D. Hoag, 2020. Public perspectives and media reporting of wolf reintroduction in Colorado. *PeerJ* 8:e9074.
- Packard, J. M., L. D. Mech, and L. Boitani. 2003. *Wolves: behavior, ecology, and conservation*. Pp: 35-65. The University of Chicago press, Chicago, Illinois, USA.
- Paetkau, D. 2022. Population Genetics Summary of WGI project g2174, NRM Wolves. *Wildlife Genetics International*.
- Painter, L. E., R. L. Beschta, E. J. Larsen, and W. J. Ripple. 2015. Recovering aspen follow changing elk dynamics in Yellowstone: evidence of a trophic cascade? *Ecology* 96:252-263.
- Parks, M. and T. Messmer. 2016. Participant perceptions of Range Rider Programs operating to mitigate wolf–livestock conflicts in the western United States. *Wildlife Society Bulletin* 40:514-524.
- Parks, M., K. Podruzny, S. Sells, T. Parks, T. Smucker, N. Lance, and W. Cole. 2023. *Montana Gray Wolf Conservation and Management 2022 Annual Report*. Montana Fish, Wildlife & Parks. Helena, Montana. 53 pages.
- Parrish, J., N. Nickerson, and K. McMahon. 1997. Nonresident summer travelers to Montana, profiles and characteristics. Institute for Tourism and Recreation Research, University of Montana, Missoula.
- Paterson, C. J., N. J. DeCesare, T. A. Hayes, C. J. Bishop, and M. S. Mitchell. 2022. Consequences of migratory strategy on habitat selection by mule deer. *Journal of Wildlife Management* 86:e22135.

- Paterson, J. T., K. M. Proffitt, N. J. DeCesare, J. A. Gude, and M. Hebblewhite. 2022. Evaluating the summer landscapes of predation risk and forage quality for elk (*Cervus canadensis*). *Ecology and Evolution* 12: E9201.
- Peterson, R. O. 1974. Wolf ecology and prey relationships on Isle Royale. Purdue University.
- Peterson, R. O., and P. Ciucci. 2003. The wolf as a carnivore. Pages 105–130 in L. D. Mech and L. Boitani, editors. *Wolves: Behavior, Ecology and Conservation*. University Of Chicago Press, Chicago, Illinois, USA.
- Pletscher, D. H., R. R. Ream, D. K. Boyd, M. W. Fairchild, K. E. Kunkel. 1997. Population dynamics of a recolonizing wolf population. *Journal of Wildlife Management* 61(2):459-465.
- Plummer, M. 2003. JAGS: A program for analysis of Bayesian graphical models using Gibbs sampling. *Proceedings of the 3rd International Workshop on Distributed Statistical Computing (DSC 2003)* 20–22.
- Plummer, M., A. Stukalov, and M. Denwood. 2019. rjags: Bayesian Graphical Models using MCMC. <<http://mcmc-jags.sourceforge.net>>.
- Post, E., R. O. Peterson, N. C. Stenseth, and B. E. McLaren. 1999. Ecosystem consequences of wolf behavioural response to climate. *Nature* 401:905–907.
- Proffitt, K. M., J. A. Cunningham, K.L. Hamlin, and R.A. Garrott. 2014. Bottom-Up and Top-Down Influences on Pregnancy Rates and Recruitment of Northern Yellowstone Elk. *Journal of Wildlife Management* 78:1383-1393.
- Proffitt, K. M., J. L. Grigg, K. L. Hamlin, and R. A. Garrott. 2009. Contrasting effect of wolves and human hunters on elk behavioral responses to predation risk. *Journal of Wildlife Management* 73:345-356.
- Punt, A. E., D. S. Butterworth, C. L. Moor, J. A. A. De Oliveira, and M. Haddon. 2016. Management strategy evaluation: best practices. *Fish & Fisheries* 17:303–334.
- Ramler, J. P., M. Hebblewhite, D. Kellenberg, and C. Sime. 2014. Crying Wolf? A Spatial Analysis of Wolf Location and Depredations on Calf Weight. *American Journal of Agricultural Economics* 96(3):631-656
- Ream, R., M. Fairchild, D. Boyd, and D. Pletscher. 1991. Population dynamics and home range changes in a colonizing wolf population. Pages 349-366 in M. Boyce and R. Keiter, eds. *The Greater Yellowstone Ecosystem: redefining America's wilderness heritage*. Yale University Press, New Haven, Connecticut.
- Rich, L. N., R. E. Russell, E. M. Glenn, M. S. Mitchell, J. A. Gude, K. M. Podruzny, C. A. Sime, K. Laudon, D. E. Ausband, and J. D. Nichols. 2013. Estimating occupancy and predicting numbers of gray wolf packs in Montana using hunter surveys. *Journal of Wildlife Management* 77:1280–1289.
- Riley, S. J., M. Cross, and E. F. Pomeranz. 2022. An assessment of public beliefs and attitudes toward wolves and wolf management in Michigan, 2021. Department of Fisheries and Wildlife, Michigan State University, East Lansing, MI, USA.
- Ripple, W.J., E.J. Larsen, R.A. Renkin, and D.W. Smith. 2001. Trophic cascades among wolves, elk and aspen on Yellowstone National Park's northern range. *Biological Conservation* 102:227-234.
- Roffler, G. H., K. L. Pilgrim, K. E. Zarn, M. K. Schwartz, and T. Levi. 2023. Variation in adult and pup wolf diets at natal den sites is influenced by forest composition and configuration. *Ecology and Evolution*, 13: e9648.

- Rotella, J., B. Jimenez, R. Garrott, M. Forzley, K. Proffitt, and J. T. Paterson. 2020. Evaluating carnivore harvest as a tool for increasing elk calf survival and recruitment. Annual Interim Report for Federal Aid in Wildlife Restoration Grant W-163-R-1. Montana Fish, Wildlife and Parks, Helena, Montana. USA.
- Runge, M.C., Grand, J.B., Mitchell, M.A. 2013. Chapter 5: Structured Decision Making. In Krausman, P.R. & Cain III J.W. Eds., *Wildlife management and conservation: contemporary principles and practices*, 51-72. The Johns Hopkins University Press.
- Ruprecht, J. S., D. E. Ausband, M. S. Mitchell, E. O. Garton, P. Zager. 2012. Homesite attendance based on sex, breeding status, and number of helpers in gray wolf packs. *Journal of Mammalogy* 93:1001–1005.
- Ruth, T. K. and K. M. Murphy. 2010. Competition with other carnivores for prey. Pages 163-172 in M. Hornocker and S. Negri, editors. *Cougar ecology and conservation*. University of Chicago Press, Chicago, Illinois, USA.
- Santiago-Ávila, F. J., A. M. Cornman, and A. Treves. 2018. Killing wolves to prevent predation on livestock may protect one farm but harm neighbors. *PlosOne* <https://doi.org/10.1371/journal.pone.0189729>.
- Santiago-Ávila, F. J. and A. Treves. 2022. Poaching of protected wolves fluctuated seasonally and with non-wolf hunting. *Scientific Reports* 12: 1738.
- Schmidt, K. and D. P. J. Kuijper. 2015. A “death trap” in the landscape of fear. *Mammal Research* 60:275– 284.
- Schroeder, S. A., A. C. Landon, L. Cornicelli, L. McInenly, and D. Stark. 2020. Minnesotans’ attitudes toward wolves and wolf management. University of Minnesota, Minnesota Cooperative Fish and Wildlife Research Unit, Department of Fisheries, Wildlife, and Conservation Biology.
- Sells, S. N., A. C. Keever, M. S. Mitchell, J. A. Gude, K. M. Podruzny, and B. Inman. 2020. Improving estimation of wolf recruitment and abundance, and development of an adaptive harvest management program for wolves in Montana. Final Report for Federal Aid in Wildlife Restoration Grant W-161-R-1. Helena, Montana, USA.
- Sells, S. N., and M. S. Mitchell. 2020. The economics of territory selection. *Ecological Modelling* 15.
- Sells, S. N., M. S. Mitchell, K. M. Podruzny, J. A. Gude, A. C. Keever, D. K. Boyd, T. D. Smucker, A. A. Nelson, T. W. Parks, N. J. Lance, M. S. Ross, and R. M. Inman. 2021. Evidence of economical territory selection in a cooperative carnivore. *Proceedings of the Royal Society B: Biological Sciences* 288:20210108.
- Sells, S. N., K. M. Podruzny, J. J. Nowak, T. D. Smucker, T. W. Parks, D. K. Boyd, A. A. Nelson, N. J. Lance, R. M. Inman, J. A. Gude, S. B. Bassing, K. E. Loonam, and M. S. Mitchell. 2022b. Integrating basic and applied research to estimate carnivore abundance. *Ecological Applications*: e2714.
- Sells, S. N., M. S. Mitchell, K. M. Podruzny, D. E., Ausband, D. J. Emlen, J. A. Gude, T. D. Smucker, D. K. Boyd, and K. E. Loonam. 2022a. Competition, prey, and mortalities influence gray wolf group size. *Journal of Wildlife Management* 86: e22193.
- Sime, C. A., E. Bangs, E. Bradley, J. E. Steuber, K. Glazier, P. J. Hoover, V. Asher, K. Laudon, M. Ross, and J. Trapp. 2007. Gray wolves and livestock in Montana: A recent history of damage management. *Proceedings of the 12th Wildlife Damage Management Conference* (D.L. Nolte, W.M. Arjo, D.H. Stalman, Eds).

- Slagle, K. M., J. T. Bruskotter, and R. S. Wilson. 2012. The role of affect in public support and opposition to wolf management. *Human Dimensions of Wildlife* 17:44-57.
- Smith, C. A. 2011. The role of state wildlife professionals under the public trust doctrine. *Journal of Wildlife Management* 75:1539-1543.
- Smith, D. W., K. M. Murphy, and D. S. Guernsey. 2000. Yellowstone Wolf Project: Annual Report, 1999. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-NR-2000-01.
- Smith, D. W., P. J. White, D. R. Stahler, A. Wydeven, and D. E. Hallac. 2016. Managing Wolves in the Yellowstone Area: Balancing Goals Across Jurisdictional Boundaries. *Wildlife Society Bulletin* 40:436-445.
- Smith, D. W., R. O. Peterson, and D. B. Houston. 2003. Yellowstone after wolves. *BioScience* 53:330-340.
- Smith, D. W., T. D. Drummer, K. M. Murphy, D. S. Guernsey, S. B. Evans. 2004. Winter prey selection and estimation of wolf kill rates in Yellowstone National Park, 1995-2000. *Journal of Wildlife Management* 68:153-166.
- Solomon, N. G., and J. A. French, editors. 1997. *Cooperative breeding in mammals*. Cambridge University Press, Cambridge.
- Sommer, E. 2021. *Montana Sheep & Lamb Losses—2020*. U. S. Department of Agriculture, National Agricultural Statistics Service, Helena, MT, USA.
- Sparkman, A. M., J. Adams, A. Beyer, T. D. Steury, L. Waits, and D. L. Murray. 2011. Helper effects on pup lifetime fitness in the cooperatively breeding red wolf (*Canis rufus*). *Proceedings of the Royal Society* 278:1381–1389.
- Stahler, D., B. Heinrich, and D. Smith. 2001. Common ravens preferentially associate with gray wolves as a foraging strategy. Abstract in *Proceedings of the 13th Annual North American Interagency Wolf Conference*, April 2001, Chico Hot Springs.
- Stahler, D. R., D. R. MacNulty, R. K. Wayne, B. VonHoldt, and D. W. Smith. 2013. The adaptive value of morphological, behavioural and life-history traits in reproductive female wolves. *The Journal of Animal Ecology* 82:222–34.
- Stahler, D. R., D. W. Smith, and D. S. Guernsey. 2006. Foraging and feeding ecology of the gray wolf (*Canis lupus*): Lessons from Yellowstone National Park, Wyoming, USA. *Journal of Nutrition* 136:1923S-1926S.
- Stenglein, J. L., J. Zhu, M. K. Clayton, and T. R. Van Deelen. 2015. Are the numbers adding up? Exploiting discrepancies among complementary population models. *Ecology and Evolution* 5:368–376.
- Stockwell, H. 2021. *A guide to the Montana Environmental Policy Act*. Montana Legislative Environmental Policy Office, Environmental Quality Council, Helena, MT, USA. <http://leg.mt.gov/eqc>.
- Stone, S. A., S. W. Breck, J. Timberlake, P. M. Haswell, F. Najera, B. S. Bean, and D. J. Thornhill. 2017. Adaptive use of nonlethal strategies for minimizing wolf–sheep conflict in Idaho. *Journal of Mammalogy* 98:33-44.
- Tallian, A., A. Ordiz, M. C. Metz, B. Zimmermann, C. Wikenros, D. W. Smith, D. R. Stahler, P. Wabakken, J. E. Swenson, H. Sand, and J. Kindberg. 2021. *Of wolves and bears: seasonal Ecological Monographs* 92:e1498.

- Teel T. L., A. A. Dayer, M. J. Manfredo, and A. D. Bright. 2005. Regional results from the research project entitled Wildlife Values in the West. Colorado State University. Human Dimensions in Natural Resources Unit.
- Treves, A. and J. Bruskotter. 2014. Tolerance for predatory wildlife. *Science* 344:476-477
- Turner, M.G., W.H. Romme, and R.H. Gardner. 1999. Prefire heterogeneity, fire severity, and early postfire plant reestablishment in subalpine forests of Yellowstone National Park, Wyoming. *International Journal of Wildland Fire* 9:21-36.
- Urbigit, C. and J. Urbigit. 2010. A Review: The Use of Livestock Protection Dogs in Association with Large Carnivores in the Rocky Mountains. *Sheep and Goat Research Journal* 25:1-8.
- U. S. Census Bureau. 2021. Population total and intercensal tables, Population and Housing Unit Estimates Program. Available at: <https://ceic.mt.gov/People-and-Housing/Population>
- U.S. Department of Agriculture. 2015. Cattle and Calves Death Loss in the United States Due to Predator and Nonpredator Causes, 2015. USDA-APHIS-VS-CEAH #745.1217. Fort Collins, CO, USA.
- U.S. Fish and Wildlife Service. 1994a. The reintroduction of gray wolves to Yellowstone National Park and Central Idaho. Final Environmental Impact Statement. U.S. Fish and Wildlife Service, Denver, Colorado, USA.
- U. S. Fish and Wildlife Service. 1994b. Summary of public comments on the Draft Environmental Impact Statement for the reintroduction of gray wolves to Yellowstone National Park and central Idaho. U. S. Fish and Wildlife Service, Helena, Montana, USA. 21pp.
- U.S. Fish and Wildlife Service (USFWS). 2009. Final Rule to Identify the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment and To Revise the List of Endangered and Threatened Wildlife. *Federal Register* 74:15070-123.
- U. S. Fish and Wildlife Service. 2000. Proposal to reclassify and remove the gray wolf from the list of endangered and threatened wildlife in portions of the conterminous United States. *Federal Register* 65(135):43449-43496.
- U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2001. Rocky Mountain Wolf Recovery 2000 Annual Report. USFWS, Helena, MT, USA. 35pp.
- Vest, J. H. C. 1988. The medicine wolf returns: traditional Blackfeet concepts of *Canis lupus* Western Wildlands 14:28-33.
- Vucetick, J. A. 2021. *Restoring the Balance*. John Hopkins University Press, Baltimore, MD, USA.
- Vucetich, J. A., D. W. Smith, and D. R. Stahler. 2005. Influence of harvest, climate and wolf predation on Yellowstone elk, 1961-2004. *Oikos* 111:259-270.
- Wambolt, C.L., K.S. Walhof, and M.R. Frisina. 2001. Recovery of big sagebrush communities after burning in south-western Montana. *Journal of Environmental Management* 61:243-252.
- White, K. A. J., M. A. Lewis, and J. D. Murray. 1996. A Model for Wolf-Pack Territory Formation and Maintenance. *Journal of Theoretical Biology* 178:29-43.

- White, P. J., K. M. Proffitt, L. D. Mech, S. B. Evans, J. A. Cunningham, and K. L. Hamlin. 2010. Migration of northern Yellowstone elk: implications of spatial structuring. *Journal of Mammalogy* 91:827-837.
- White, P. J. and R. A. Garrott. 2005. Northern Yellowstone elk after wolf restoration. *Wildlife Society Bulletin* 33:942-955.
- White, P. J., R. A. Garrott, K. L. Hamlin, R. C. Cook, J. G. Cook, and J. A. Cunningham. 2011. Body condition and pregnancy in northern Yellowstone elk: evidence for predation risk effects? *Ecological Applications* 21:3-8.
- Wieseler, A., et al. 2023. Montana Fish, Wildlife and Parks' 2022 chronic wasting disease surveillance and monitoring report. PR Management Grant Annual Report.
- Wikenros, C., M. Gicquel, B. Zimmermann, O. Flagstad, and M. Akesson. 2021. Age at first reproduction in wolves: different patterns of density dependence for females and males. *Proceedings of the Royal Society* 288:20210207.
- Wild, M. A., N. T. Hobbs, M. S. Graham, and M. W. Miller. 2011. The role of predation in disease control: a comparison of selective and nonselective removal on prion disease dynamics in deer. *Epidemiology* 47:78-93.
- Wilensky, U. 1999. NetLogo. Center for Connected Learning and Computer-Based Modeling, Northwestern University, Evanston, IL. <<http://ccl.northwestern.edu/netlogo/>>.
- Williams, C. K., G. Ericsson, and T. A. Heberlein. 2002. A quantitative summary of attitudes toward wolves and their reintroduction (1972-2000). *Wildlife Society Bulletin* 30:575-584.
- Wilmers, C.C., R.L. Crabtree, D.W. Smith, K.M. Murphy and W.M. Getz. 2003. Trophic facilitation by introduced top predators: grey wolf subsidies to scavengers in Yellowstone National Park. *Journal of Animal Ecology* 72:909-916.
- Wilson, S. M., E. H. Bradley, and G. A. Neudecker. 2017. Learning to Live With Wolves: Community-based Conservation in the Blackfoot Valley of Montana. *Human-Wildlife Interactions* 11 <https://doi.org/10.26077/bf8e-6f56>.
- Wolf, E. C., D. J. Cooper, and N. T. Hobbs. 2007. Hydrologic regime and herbivory stabilize an alternative state in Yellowstone National Park. *Ecological Applications* 17:1572-1587.
- Wright, G. J., R. O. Peterson, D. W. Smith, and T. O. Lemke. 2006. Selection of northern Yellowstone elk by gray wolves and hunters. *Journal of Wildlife Management* 70:1070-1078.
- Young, J. K. 2022. Landowner collaborative strategies for grizzly and wolf conflict reduction. Research CIG Proposal: Montana Dept. of Fish, Wildlife and Parks, Helena, MT, USA.

# CHAPTER 8 APPENDICES